Environment-Compatible Production Line

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1. Introduction

Recently, active commitment to address various issues related to the global environment has increaced. Our Servo System Division, with all its plants certified with ISO14001 (Environment Management System), finds it necessary to further commit itself to addressing the environmental issues.

The units involved in production are trying to find better ways to reduce the waste that arises from the production process and to reduce the energy used in production.

This article describes the recycling of packing cartons for servomotors and amplifiers, and our efforts to reduce the leakage of compressed air at our Midorigaoka plant to reduce power consumption.

2. Recycling Packing Cartons

2.1 Overview

The packing carton for servomotors or amps is constructed of a corrugated cardboard box, partitions, and pads. When it is delivered to the customer, the motor or amp will be taken out, leaving the corrugated cardboard box, partitions, and pads to be disposed of or recycled. Out of concern for the environment, it is this waste that needs to be reduced.

Because we were aware that most of the materials used in packing cartons are disposed of, we concentrated on reducing these materials.

We have also been aware that packing cartons need not be disposed of if they could be recycled. We are reviewing the specificaions of our packing cartons in order to introduce new specifications of packing cartons that can be recycled (hereafter referred to as "goods delivery box"), then switching to the new packing carton accepted by our customers.

2.2 Goods Delivery Box Specifications

We have changed the specifications of the goods delivery box such that the outer box of corrugated cardboard is replaced with that of plastic, with polyethylene foam, polyurethane foam, and styrofoam used as the materials for the partition and pads so they can be both recycled and more effective as shock absorbers. Table 1 compares its specifications to those of a conventional type. Fig. 1 illustrates the structure of Packing Carton Specifications.

Table 1 Packing Carton Specifications Comparison

	Old Specs	Goods Delivery Box Specs
Outer box	Corrugated cardboard box	Plastic case Folding type
Partition	Corrugated cardboard pad	Polyethylenefoam Polyurethanefoam Styrofoam
Pad	Corrugated cardboard pad Corrugated cardboard spacer Paper cushion	Polyethylene foam Polyurethane foam

2.3 Results

Switching to the goods delivery box has made it possible to recycle what would have been disposed of as waste before; thus reducing the amount of waste materials such as corrugated cardboard boxes and corrugated cardboard pads.

We will continue to improve along this line.

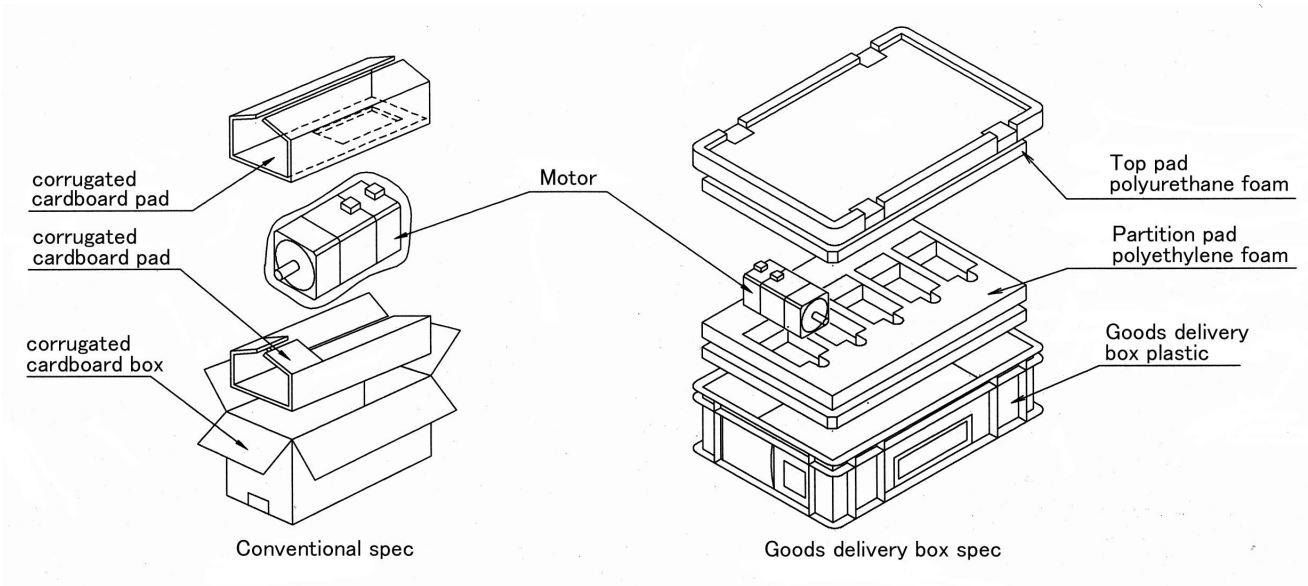


Fig. 1 Packing Carton Specifications

3. Reducing Compressed Air Leakage

3.1 Overview

Compressed air, extensively used in plants, is playing an important role in many industries. But, checking a plant, one can usually find many places where there is leakage of compressed air, representing a considerable amount of energy being wasted.

Having measured the pressure characteristics of the compressed air in the plant, we are trying to reduce the leakage ratio from 50% to 25% as the target. So far we have achieved the leakage ratio as low as 29%.

3.2 Method of Measuring Compressed Air Leakage

To measure the leakage of compressed air, first run the compressor while not using any compressed air. Then from the time the pressure rises, and the time the pressure falls in the piping system, calculate the leakage and measure the power reduction.

Fig. 2 is the measurement result.

3.3 Actions Taken and To Be Taken

3.3.1 Actions Taken

(1) Air drain piping valve replaced
(2) Compressor air dryer repaired
(3) After-cooler drain valve replaced
(4) System/piping air leakage repaired and others

3.3.2 Actions To Be Taken

(1) To install switching valves on any equipment that continues to leak compressed air (such as air micros) to prevent leakage.
(2) To repair compressed air leakage inside the system.

3.4 Reduction Effects

From the compressed air leakage reduction, the reduction in the length of operating time as an effect it has on the compressor performance can be calculated as follows:

(1) Power reduction for two compressors

37kw/unit×2units×24h×30days×0.18
=9,590kwh/month

(2) Effects
Cost: 126,000 yen
Cost effect: 134,000 yen/month
Payout time: 0.94 month
(3) Fig. 3 is a graph of leakage reduction

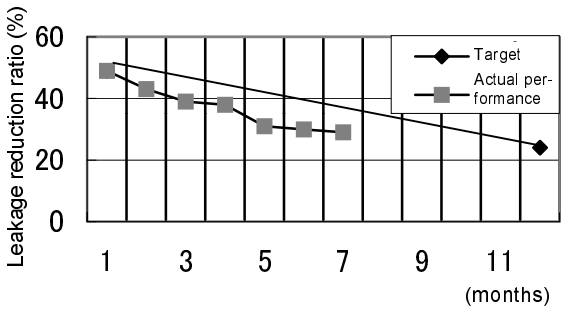
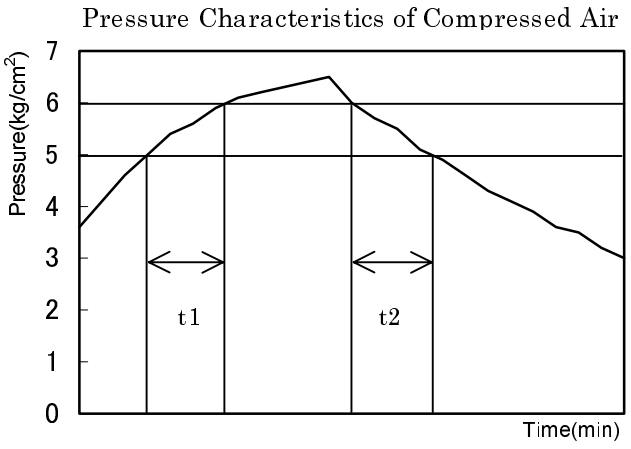


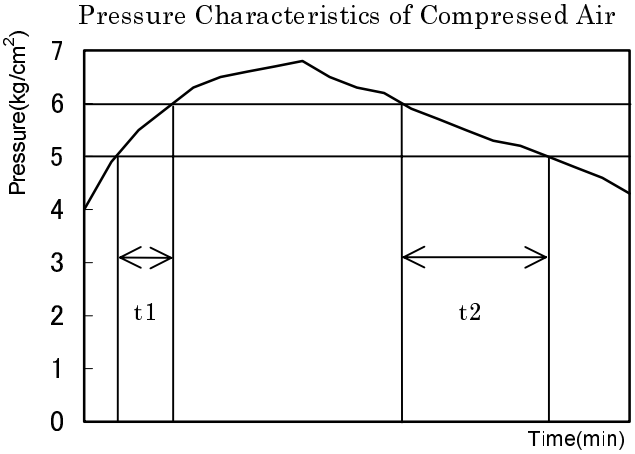
Fig. 3 Graph of Leakage Reduction

Before taking actions



・Air leakage ration: 48.6%
L1={t1/(t1+t2)}×100
48.6={1.7/(1.7+1.8)}×100

After taking actions



・Air leakage ration: 29.0%
L1={t1/(t1+t2)}×100
29.0={1.0/(1.0+2.45)}×100

Fig.2 Pressure characteristic before and after taking the action

4. Conclusion

We have seen a substantial reduction in waste materials and packing cost through recycling the packing cartons for motors and amps. We will continue with this packing carton recycling task, extending it to purchased products to reduce the packing materials.

In our effort to reduce compressed air leakage, we have been taking action where there is large leakage. We intend to improve on the system so each individual unit can be switched over separately according to the operating status of the system and production line.
Switching one unit over to another as frequently as necessary will surely lead to further reduction in the energy consumed.

We will redouble our efforts to reduce the energy expended in the production process, thus contributing to the improvement of global environment.

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