Manufacturing Environmentally Friendly Products Under Independent Standards

The Yokogawa Group develops environmentally friendly products under independent guidelines it has established for long-term use, energy conservation, resource conservation, reducing toxic substances, recyclability, and other parameters.

Guidelines for Environmentally Friendly Design

The Yokogawa Group develops new products based on various guidelines and standards it has established for the development of environmentally friendly products.

(1) Environmentally Friendly Product Design Guidelines

These guidelines establish design, machining, and assembly methods which incorporate long-life design, energy conservation design, resource conservation design, materials and parts selection guidelines, recycling, and disposal.

(2) Environmental Assessment Standards for Product Design

Yokogawa has established assessment standards in eight areas: ease of recycling and treatment; resource conservation; energy conservation; long-term usability; ease of collection and transport; safety and environmental protectiveness; information disclosure; and packaging. These standards are used in conducting assessments during each inspection (initial design, intermediate design, and final design).

(3) Standards for Toxic Substances Contained in Products

These standards are used to select parts and materials with consideration for the environment in the design stage. They specified four prohibited substances (including designated odorous flame retardants) and 38 substances which are to be reduced.
Yokogawa is currently revising these standards so that they will comply with the Green Procurement Study Standardization Guidelines.

(4) Lifecycle Assessment Standards

These standards are used for preliminary assessment of energy use, CO_2 emissions, NOx emissions, SOx emissions, and the like. These standards are used in conducting assessments during each inspection (initial design, intermediate design, and final design).

(5) Recycled Product Design Standards

These standards serve to encourage waste reduction, reuse, and recycling.

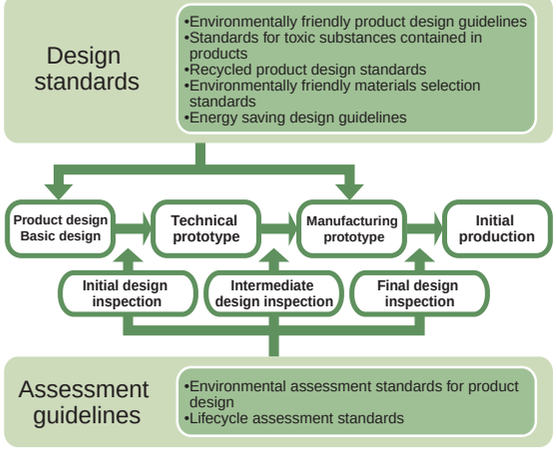
(6) Environmentally Friendly Materials Selection Standards

These standards state that the use of highly toxic hexavalent chromium and halogen-based flame retardants is to be avoided. They also list recommended products for chrome-free steel plates and the like, as well as usage precautions.

(7) Energy Saving Design Guidelines

These guidelines state that energy is to be conserved in the product use and manufacturing stages. They introduce energy conservation design technologies for products, and energy conservation design technologies for manufacturing.

Environmentally Friendly Design Standards and Assessment Standards



Environmental Assessment Standards for Product Design

1. When	Initial design inspection, intermediate design inspection, final design inspection
2. Assessment items	29 items, including ease of recycling and treatment; resource conservation; energy conservation; long-term usability; ease of collection and transport; safety and environmental protectiveness; information disclosure; and packaging
3. Evaluation criteria	Score is 0 points if legal regulations are not satisfied. Score is 4 points if legal regulations are satisfied and improvement of 30% or better is achieved; 3 points for improvement of 15%; 2 points for improvement of 5%; and 1 point for improvement of less than 5%.
4. Pass/fail judgment criteria	In order to pass, there must be no assessment items with a score of 0, and the total score must be greater than that of the old model. A “failed” judgment is given if any of the assessment items has a score of 0, or if the total score is the same as or less than that of the old model. The improvement guidelines target an improvement of 25% or better, and more than anything seek to incorporate environmental-burden reduction into design.

Support for Environmentally Friendly Label

In 1999 the Yokogawa Group became the first company in the measuring instruments industry to introduce self-declared environmental labels (Type II) as specified in ISO14021. The environmental labels were designed based on the "Environmentally Friendly Design Standards and Assessment Standards" presented on page 16. They are used to label products that are more environmental friendly than older products or similar products, and which contribute to customers' global environmental protection efforts. The environmental label consists of a measurement gauge-a symbol of Yokogawa's business-drawn inside a green leaf. Environmental information, such as particular improvements or features in the product, is included below the label.

By the end of last fiscal year, Yokogawa had introduced more than ten products with environmental labels since 1999. In addition, Yokogawa's offerings include the DL7400 Series of oscilloscopes, the PZ4000 power analyzer, and other products that help customers develop environmentally friendly products. Going forward, Yokogawa will continue to develop environmentally friendly products as well as measuring instruments that help protect the environment. Detailed information on products carrying the environmentally friendly label is available at the Yokogawa website.

Products with Environmentally Friendly Label

Reduced power consumption for resource conservation  **DAQMASTER MX100**	**Consumes about 50% less power than Yokogawa's DL2700 (8-channel model)**  **DL7480 Digital Oscilloscope**
Consumes about two-thirds less power than Yokogawa's DL1540C  **DL1640 Digital Oscilloscope**	**About half the size of the DL716**  **DL750 ScopeCorder**
Paperless recording for resource conservation  **DAQSTATION CX2000**	**A useful tool for designing energy saving products**  **PZ4000 Power Analyzer**
Weight reduced by 54% and volume reduced by 52% compared to Yokogawa's DL2700  **DL7200 Digital Oscilloscope**	**Paperless recording for resource conservation**  **DAQSTATION DX100**
A useful tool for designing energy saving products  **WT230 Digital Power Meter**	**Paperless recording for resource conservation**  **MV100 MobileCorder**

Using Guidelines to Increase the Popularity of Environmentally Friendly Products

In order to increase the popularity of environmentally friendly products, Yokogawa has established Green Procurement Guidelines for raw materials and parts, and Green Purchasing Guidelines for daily-use products such as stationery and uniforms. Yokogawa's purchasing practices are based on these guidelines.

Green Procurement

The Yokogawa Group strives to provide environmentally friendly products as part of its efforts to help build a sustainable society. In order to meet this goal, Yokogawa has established Green Procurement Guidelines which clarify conditions for reducing the burden on the environment.

In addition, Yokogawa conducts studies based on these guidelines to evaluate the corporate strength of its vendors, and to evaluate environmental burden substances. The corporate strength evaluation consists of ten topics, including environmental management and environmental burden. The environmental impact substance evaluation determines the presence or absence of toxic substances based on the Environmental Burden Substance Research Sheet.

Evaluations are graded as A, B, and C. The environmental burden reduction measures shown in the table below are applied to new vendors, as well as to those with a grade of B or C. In fiscal year 2003, Yokogawa studied 59 parts and materials vendors and 51 subcontracting vendors. Two of the general materials vendors and five of the subcontractors received grade C evaluations. If a vendor receives a C evaluation, we do not stop doing business with them. Instead, we strengthen our partnership and provide environmental protection guidance so that their evaluation will steadily improve.

Environmental Burden Reduction Measures

Parts and materials vendors	Grade B: Yokogawa sends a letter requesting them to acquire ISO14001 certification or to institute an equivalent management system. Grade C: In addition to the above, Yokogawa sends a letter requesting cooperation and rapid improvement in environmental protection.
Subcontractors	Grade B: Yokogawa sends a letter requesting cooperation and rapid improvement in environmental protection. Grade C: In addition to the above, Yokogawa visits them and gives guidance on environmental protection.

Green Purchasing

To encourage all employees to consider the environment when purchasing indirect materials (such as office supplies), products, and services, Yokogawa established its Green Purchasing Guidelines. In determining the types of environmentally friendly products to purchase, Yokogawa employees proactively obtain and utilize environmental information, and evaluate factors such as the necessity for a purchase, the lifecycle of a product or service, and a vendor's efforts to help protect the environment. These evaluations are summarized below.

1) Consideration for the necessity of a purchase (the following factors are considered in the order shown)

(1) Possibility of repairs
(2) Possibility of joint (shared) use
(3) Possibility of rental
(4) Possibility of replacing consumables

2) Consideration for the lifecycle of a product or service

Consideration for various environmental burden's over the lifecycle or a product or service, including energy conservation, long-term use, recycling potential, and use of recycled materials

3) Consideration for a vendor's efforts to help protect the environment

Consideration for a vendor's efforts to help reduce environmental burdens, such as whether the vendor tries to improve its environmental efforts at the organizational level, and whether the vendor provides environmental information to the public

In addition, when employees actually select and purchase products, a system is used which allows them to easily view information and make purchases on a PC.
In fiscal year 2003, Yokogawa again set a target of 80% (at the four sites with general certification) for the green purchasing of stationery-a target that was not met in fiscal year 2002. Yokogawa increased its eco-purchasing efforts, such as by reviewing the array of eco-products it purchases. As a result of these efforts, eco-purchasing rose to 86.9%, meeting the target. In addition, Yokogawa continued with its switch to new uniforms in keeping with the Uniforms and Work Clothes Guidelines, which were established in fiscal year 2002.

Contributing to Customers' Environmental Management Practices

The Yokogawa Group is working hard to develop environmentally friendly products that support the environmental management practices of our customers. Two of the new products we developed in fiscal 2003 are presented below.

A miniaturized differential pressure transmitter integrating the functions of two older products in a single package

DPharp EJX Series

Until now, flow-rate measurements at various types of plants have been done by installing a separate differential pressure gauge and pressure gauge on a single line to sense and control the flow rate. The DPharp EJX Series, which Yokogawa released in October 2003, integrates both of these functions in a single differential pressure transmitter which weighs 32% less than the previous model.
The environmental burden reduction measures incorporated into the DPharp EJX provide reductions of 25.6% in CO_2 emissions, 25.1% in NOx emissions, and 28% in SOx emissions compared to the previous model.

In addition, the performance of the vibration sensor, which incorporates micromachining technology, was improved, increasing response speed by a factor of four.

As a result, the DPharp EJX is now capable of performing the high-speed controls required for applications such as turbine steam flow rate control.

DPharp EJX

The world's first electromagnetic flow meter with an adhesion diagnostic function

ADMAG AXF Series

The ADMAG AXF is a flow meter which utilizes the fact that when a conductive fluid passes through a magnetic field, an electromotive force proportionate to its speed is generated. With a newly developed adhesion diagnostic function, the ADMAG AXF enables the user to monitor in real time adhering deposits, which can cause equipment failures. The flow meter itself displays alarms and recommended actions according to conditions, thereby significantly reducing the customer's maintenance costs and increasing service life. In addition, the ADMAG AXF includes a number of user-friendly refinements, such as reduced size and weight, and a conversion unit which allows the direction to be freely changed. The environmental burden reduction measures incorporated into the ADMAG AXF provide reductions of 25.2% in CO_2 emissions, 24.2% in NOx emissions, and 27.2% in SOx emissions compared to the previous model.

INTERVIEW

The environment is a natural consideration in designing new products

Osamu Yoshikawa,
Manager, Development & Engineering Dept. III, Field Instrument Business Division, IA Business HQ

In designing new products, the engineers at Yokogawa consider environmental issues in their efforts to create user-friendly products that truly meet users' needs.
One important feature of the ADMAG AXF is the use of dual-frequency magnetic excitation (combining a low frequency which stabilizes the zero point, and a high frequency which tracks rapid fluid movements). This system made it possible to reduce the electric noise generated when solids mixed into the fluid hit the electrodes. As engineers, the chance to build a product which uses this new dual-frequency magnetic excitation system and also reduces CO_2 emissions was a very valuable experience.

Customer Solutions Based on Yokogawa Know-how

In today's world of rapidly changing production processes, it's not easy to incorporate energy saving measures. InfoEnergy, Yokogawa's energy conservation support system, is designed to address this challenge.

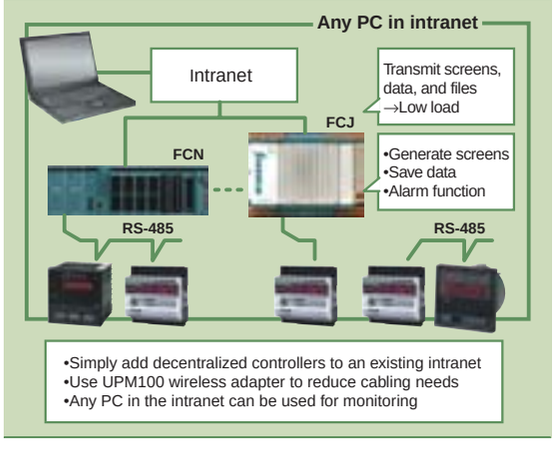
Why we developed InfoEnergy

At the YMF Kofu factory, where the Energy Monitoring System has been installed, we were able to cut electricity consumption by approximately 20% despite a 35% increase in production over the six years since the installation of this system. The initial costs of the installation were recovered over the first three years of its operation. Many such systems are now being installed at factories. However, these systems are not easy to use. In order to use such systems properly and achieve the desired energy savings, users need specialized know-how. In light of this situation, Yokogawa's Facilities Department, Development Department, and Sales Department got together and conducted a detailed study of what makes an energy saving system easy to use. As a result of these studies, Yokogawa developed an energy conservation support system, with the basic idea of providing a system which has integrated monitoring, analysis, control, and maintenance, as well as functions such as an alarm output function that is activated when an abnormality occurs; and which is designed to allow users to easily change and add functions.

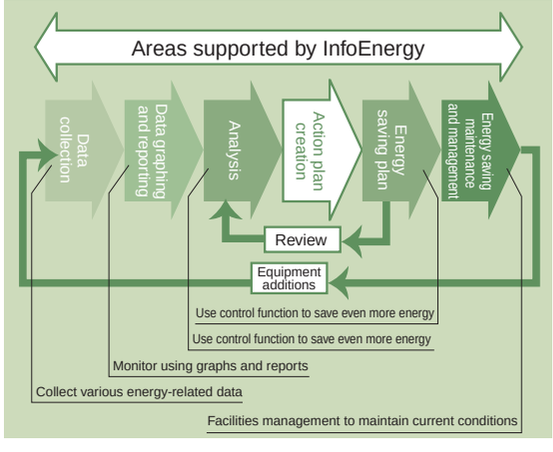
FCN/FCJ autonomous controllers: the "brains" of the InfoEnergy system

In order to create the system we wanted, we needed to add all of the required "intelligence" (software) to the controllers, which in earlier systems simply functioned as interfaces. The answer to this challenge was the FCN/FCJ autonomous controllers. These controllers do not simply distribute required screens to users that access the system via a network using any PC on the intranet; they also autonomously send alarm messages to administrators when parameter values exceed their limits. In addition, they help eliminate waste by analyzing data from individual instruments from a variety of perspectives. These data include electric power, as well as flow rates of fluids such as fuel oil, gas, water, and steam. The system functions are organized to follow the sequence of energy saving activities, and operate as follows:①data collection →②search for excessive power consumption using the analysis function →③save energy using the control function by following an action plan →④automatically maintain and manage the optimal energy level, then return to step①.
In addition to providing a package of energy saving functions designed for all users, other software applications can also be added. This gives users the flexibility to change and add functions.
Yokogawa's energy conservation experts are also available to work with customers in installing and running the InfoEnergy system, so that users can more quickly meet their energy conservation goals.

InfoEnergy System Configuration



InfoEnergy Support Functions



Updating InfoEnergy

As mentioned above, the Energy Monitoring System helped improve results at the YMF Kofu factory. In an effort to achieve further energy savings, we updated the system with a much more powerful version of the InfoEnergy system. In addition, we are installing this system incrementally at the main office/factory. In February 2004, the STARDOM system, which contains the FCN/FCJ controllers, was awarded the prestigious Editors Choice Award 2003 by Control Engineering, a US-based trade magazine which is the leading publication in the field of industrial automation.

Building a Show Site

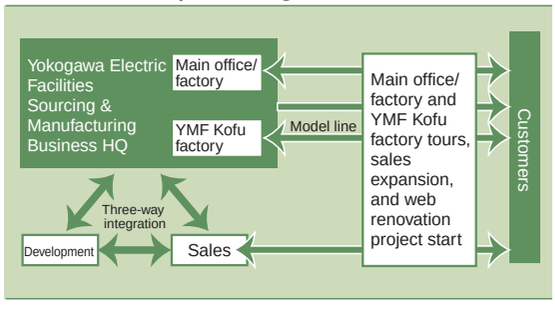
(Project for building a site which will allow customers to experience how Yokogawa's solutions provide actual benefits.)

With the installation of the Energy Monitoring System, the YMF Kofu factory was one of the first to take on the challenge of energy conservation. Now with the installation of the InfoEnergy system, we are remodeling the facilities to improve our presentations, through modifications such as additional panels and new locations for the controllers.

These changes are designed so that when customers visit the factory, it will be easier for them to understand Yokogawa's energy conservation efforts. These efforts are part of our Sales Renovation Project, which is a focal issue for the Sales Department.

After these facilities modifications are completed, it will be possible to view information on energy management at the YMF Kofu factory over the intranet.

Show Site Conceptual Design



INTERVIEW

The Benefits of Interdepartmental Collaboration

Yukio Innami,
Solution Dept. IV, Solutions Development Center, ETS Development Div., Industrial Solutions Business HQ

Although I am currently in a department on the sales side of Yokogawa, previously I was energy conservation manager at the main office/factory. Yokogawa's monitoring system at that time was not very user-friendly, and we had some complaints from customers. At one point I had a discussion with young members of the Development Department on energy conservation monitoring systems. We saw eye to eye on this issue, and this sparked interdepartmental collaboration, and eventually led to the development of the InfoEnergy system. In this sense, the development of InfoEnergy represents an important interdepartmental collaboration of young employees at Yokogawa.