Information Systems in the Era of Network*

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Synopsis:

The information system has been widely expanding its role as the network era has come. Kawasaki Steel has developed and operated systems for making proper internal work processes throughout the forty-five-year history of computerization. Along with those systems, in recent years, Kawasaki Steel exerts itself for the use of network technologies focusing on the internet. As a result, a newly added value is being generated among customers and partners by means of information interchange. In addition, information will be shared without the limitation of time and space. All of these efforts are also associated with the shortening of business cycle.

1 Introduction

In his book "Waves of Power", David C. Moshella divides the flow of computerization into (1) the age of systems, (2) the age of personal computers, (3) the age of networks, and (4) the age of contents, and considers that the present day is in a period of transition toward the network age[1]. Originally, networks had been used to transmit information from point to point. Nowadays, however, networks that have expanded dimensionally are forming foundations for social, economic and business activities.

In this paper, the history and current state of computerization at Kawasaki Steel are described and the expansion of computerized regions is then illustrated with several examples of computerization based on the use of networks among organizations and enterprises, where computerization has become very active in recent years.

2 History of Computerization at Kawasaki Steel

The following is a retrospect on 45-year history of computerization at Kawasaki Steel.

(1) Period of Computer Introduction: 1956 to 1965
Computerization in the company started with the mechanization of paperwork in the head-office. At that time, what is now described as information systems were called machine calculators and, as tools for making and recording and salary calculations, accounting calculations, etc., released humans from massive data processing.

(2) Period of Online-System Introduction: 1966 to 1975
Computerization evolved into online systems, and substantial expansion of the range and form of use began in the fields of business management, sales support, production control, etc. This was particularly noticeable in the field of production control, where quick control of line operations become possible by giving work instructions and collecting information from terminals connected to computers via networks.

(3) Period of Database Introduction: 1976 to 1985
Database systems were introduced. The integratation of database systems made it possible to consistently control the flow of information in sales, production and logistics. Databases also began to be used in decision making work regarding personnel affairs, accounting and purchasing.

(4) Period of Open-System Introduction: 1986 to 1995
Departing from the conventional mainframe-oriented concept, computerization shifted to the open-system age based on the use of standardized hardware, software and networks. It became general practice to use high-performance personal computers with a GUI (graphical user interface), in planning and management. Furthermore, interoffice mail and departmental servers came into widespread use, and the sharing of document information and data started.

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(5) Network-Oriented Period: 1996 to Date

The "one personal computer per person" environment was built, and groupware, the Internet, which is a global standard network, and the Internet, which is a system dedicated to intracompany use of the Intranet, became established as means of day-to-day information sharing and began to be used in a variety of operations, including mission-critical work.

3 Current State of Information Systems

A general configuration of the company's information systems is shown in **Fig. 1**.

(1) Back-End Systems

Back-end systems, which do the mission-critical work of an enterprise, consist of systems which support the sales, production and logistics of steel products, and systems, which support operations related to management resources such as personnel, materials and money.

(2) Front-End Systems

In contrast are front-end systems, a collective term for systems for efficiently maintaining contact with customers, partners and affiliated companies, information sharing systems for supporting decision making, and work-flow systems.

(3) Information Network Systems

These are network-related systems for information technology infrastructure that support application systems as described above. Kawatetsu Net connects each works of the company with major affiliate companies. Through Kawatetsu Net, mission-critical systems, electronic mail, the Intranet, etc., are shared on a company-wide basis. Moreover, the application of the Internet is rapidly spreading because of the ease of connection as standardization and low communications cost. The company is conducting operations based on the use of the Internet while ensuring safety by taking security measures such as electronic certificates and integrated certification.

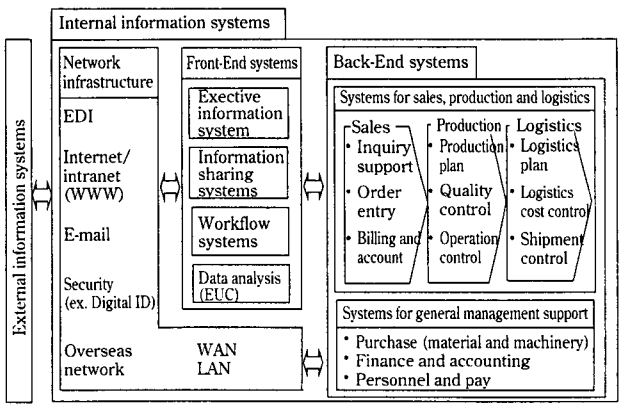

Fig. 1 System configuration

4 Examples of Information System Using Networks

4.1 Examples of Network Application in Sales and Logistics

4.1.1 Sales activity support system

The departments related to sales introduced groupware in 1996 and have since built an information sharing system that provides market information from the standpoint of "customers" or "projects". Moreover, in order to further enhance customer services, a system for retrieving information on "products" has been built to provide information on product catalogs, examples of product application and technical data, of not only Kawasaki Steel but also its affiliated companies. This information, which is stored in a database, is made available to the staff of the company and its affiliates through the intranet. Some of the data is also publicly released through the Internet (**Fig. 2**).

4.1.2 Delivery management system

At Chiba Works, a system that permits speedy coordination among the sales, production and logistics departments has been built by interchanging delivery information with trading companies in an electronic form and sharing this information in each of these department. In the delivery management system, inquiries about the delivery of products is electronized and basic information of the day related to delivery, such as trends and status of acceptance of products, is disclosed through the Internet. As a result, it has become possible for staffs and managers of trading companies, process departments and logistics departments to share information on inquiries about delivery and to efficiently and swiftly handle searches and inquiries. Also, the level of delivery management can be further improved by storing inquiries in a database and analyzing cases of past complaints and requests (**Fig. 3**).

4.1.3 System for logistics information sharing by affiliated companies

To make the most effective use of the aggregate logistic resources of the Kawasaki Steel group, the logistics department has built, by collecting logistics information of each affiliated company and analyzing logistic costs, a logistics information sharing system of the Kawasaki Steel group, K-LINK (Kawatetsu group logistics information network), which each affiliated company can utilize to improve their operations. In order to promote activities for increasing the logistics efficiency, this system comprises individual systems which operate on personal computers of each affiliated company and an information sharing system using the Internet. As a result, it has become possible to analyze not only information on logistic profit plans and logistic points, but also logistic costs of individual parts according to the

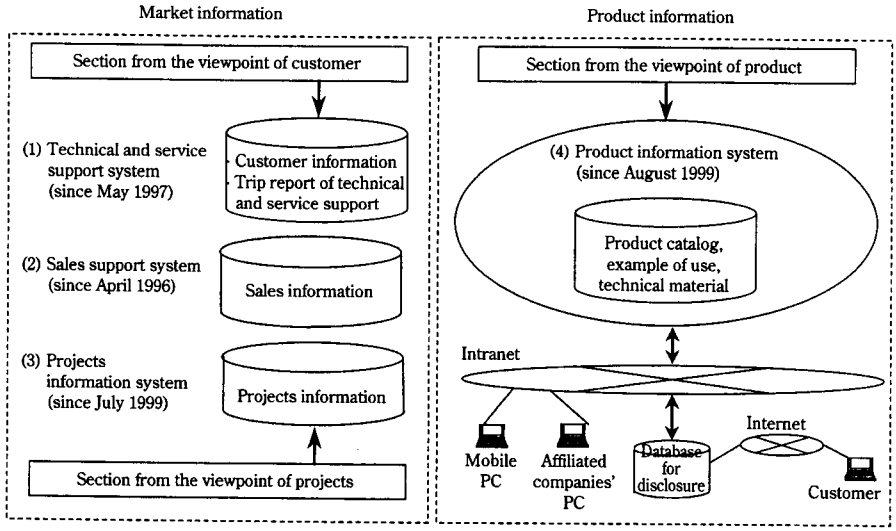

Fig. 2 Share of market information and product information

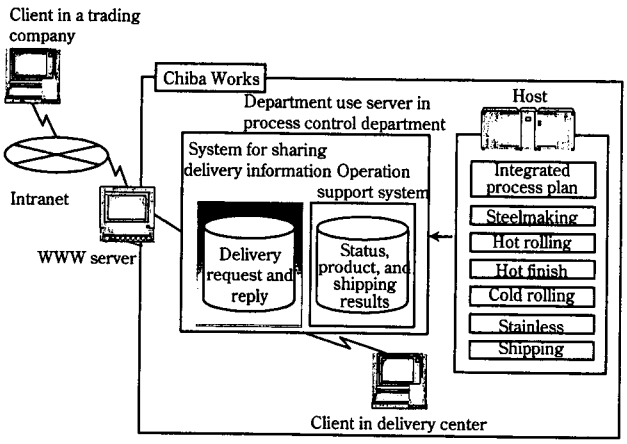

Fig. 3 Overview of delivery management system

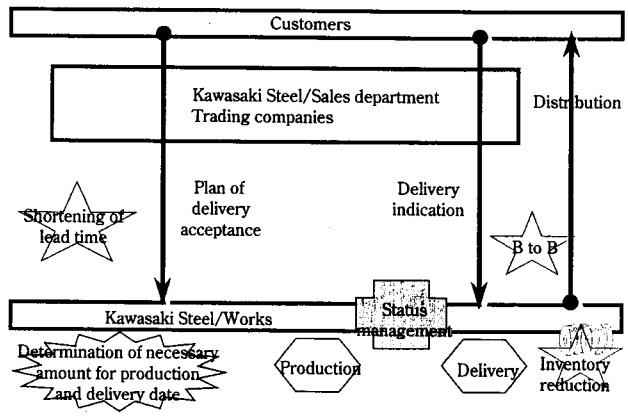

Fig. 4 Information flow of the new production system for automobile thin plate

level of computerization in each affiliated company. Furthermore, a system of planning, implementation and follow-up has been established that has reduced the logistic costs of the whole group.

4.2 Example of Network Application in Production Control

4.2.1 Prelimirary-information-based production system for automotive sheets

Since July 2000, a "prelimirary-information-based production system" has been in operation as a new system for sales and production control of automotive steel sheets. In the conventional system, trading companies and the sales department performed acceptance and deacquisition for each automotive part, determined delivery dates and quantities every ten days and transmitted orders to the works. On the basis of the delivery dates and quantities, the works manufactured automotive sheets and delivered them to customers by additional delivery indications. Furthermore, there has been some overlap in the allocation of delivery dates for delivery assurance among trading companies, the sales department and the works. In the new system, trading companies and the sales department transmit monthly quantity requirements of each automotive part as orders, the trading companies transmit the latest preliminary information (plan of delivery acceptance) to the works as required, and the works makes rough calculations of delivery dates and quantities to be conformed to on the basis of this information and actual order backlogs, and carry out the manufacturing. The process is managed by a self-management system at the works. The concepts of the new system are shown in **Fig. 4**. Aims of the system are: (1) raising the work efficiency of trading companies and the sales department by reducing the work loads of

various kinds of planning activities, activities of balancing of delivery dates and process status management activities, (2) reducing the product inventory by pull production accomplished by shortening the lead time for paperwork and optimum inventory ratio control accomplished by providing the latest information of customers, (3) promotion of B to B (business to business), and so on.

4.2.2 Remote supervisory system of product shipping berth

At Mizushima Works, fiber-optic cables with a total length of 35 km were laid in 1992 as a network infrastructure and the network was modified to an ATM (asynchronous transfer mode) in 1998 to both integrate of information systems, and make multimedia use of the network such as voice communication and image communication. As an example of image communication, a remote supervisory system of the product shipping berth is presented below. Monitor cameras capable of remote operation are installed in the berths in two places of the works and the condition of incoming and outgoing transport ships and of cargo work is supervised by realtime moving images from the general instruction room (**Photo 1**). As a result, it has become possible to perform shipping coordination between the berths and direct shipping form production lines.

4.2.3 Home-based remote business support system

In addition, at Mizushima Works, a VPN (virtual private network) that connects the homes of the company's employees and the company's network via a local cable television network has been built in conjunction with the Okayama Information Highway Project[2]. This is the first trial in Japan as a VPN that uses a cable television network. This network allows users not only to cope with computer troubles during holidays and nighttime, but also to handle sudden changes in manufacturing directions and shipping instructions and take action retained. Also, this helps to facilitate management operations at works by eliminating time lags during holidays and nighttime since managers and staff use electronic mail and a production status monitoring system.

Photo 1 Monitoring system in the general operation room

4.3 Examples of Network Application in Business Management

4.3.1 Consolidated accounting system

The company's consolidated accounting system was revamped when consolidated financial system was revised. Aims are preventing an increase in work loads associated with an expanded range of consolidated accounting, detailed disclosures, etc., and information

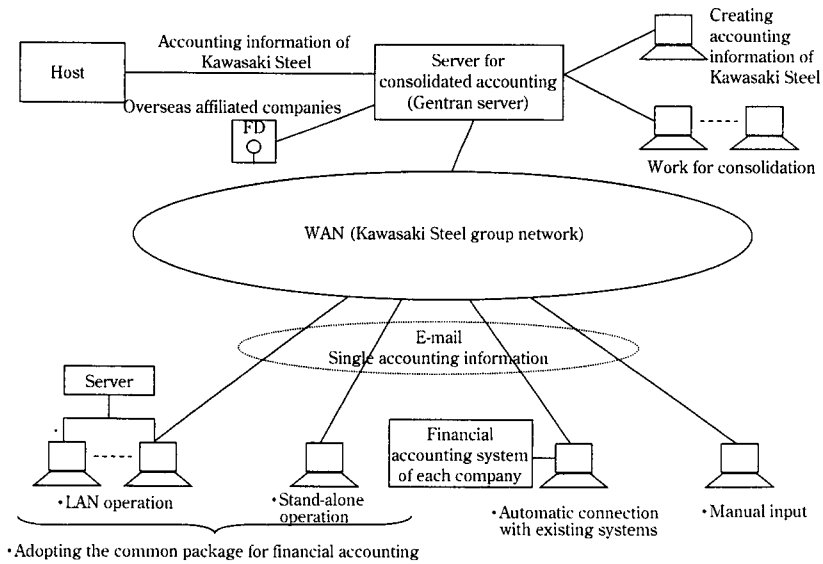

Fig. 5 Construction of consolidated accounting system

supply to support consolidated business management. In this system, accounting and financial information collected from affiliated companies is stocked as an "affiliated company database" and used in consolidated accounting operations, and various simulations for formulating the company's management strategy are made possible. A common package for financial accounting is used in order to connect the new consolidated accounting system to the existing systems of each affiliated company. Another feature is that encrypted e-mail is used for the exchange of information (**Fig. 5**).

5 Concluding Remarks

After a brief review of the history of Kawasaki Steel's information systems and the construction of the current systems, examples of computerization in the company in the network age were described. Today, information system are used as tools for "quickly sending and receiving information at any moment, from any place" and the Internet has become indispensable as an infrastructure for this purpose. In the use of networks, front-end systems tend to receive the most attention. However, in order to use these systems on a full-scale basis, it is necessary to review back-end systems and even ways of doing business themselves. The authors intend to continue to tackle these issues in the future.

Refences

1) David C. Moshella: "Waves of Power", (1997), [AMACOM, a Division of the American Managementassociation]
2) Okayama Prefectural Conference of High-infomationalized Experiment: "Report of Case Studies of High-infomationalized Experiment in Okayama Prefecture", (1998)