

Special Reports

Knowledge Processing Technologies for Service Innovation by Manufacturers

Service Provision Strategies in the Manufacturing Sector

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Analysis of Service Businesses in Manufacturing Industry and Role of Knowledge Processing Technologies

UCHIHIRA Naoshi

The movement toward a full-scale knowledge society is leading to a gradual change in attitude in the manufacturing industry. Manufacturers are required not only to supply products but also to support customers' value creation activities when the products are used.

In this paper, the provision of services by a manufacturer is defined as "the development of product-mediated value creation activities through collaboration between the customer and the manufacturer." The essence of this concept is also clarified from the viewpoint of expanding customer contacts. One of the keys in innovating the provision of services by manufacturers is effective use of knowledge processing technologies that convert information and knowledge about the product into value for the customer.

Toshiba has been engaged in research and development of knowledge processing technologies to realize service innovation in the manufacturing industry.

Intelligent Plant Maintenance by Data Mining

KUBOTA Kazuto/MORITA Chie/WATANABE Tsuneo

The plant business is currently changing from the provision of equipment to the provision of services; namely, subcontracted operational and maintenance work. In order to carry out these services safely and efficiently, information processing technology to analyze plant data will be a critical requirement.

Toshiba has applied data mining to power plant operation management and achieved promising results. We will further develop intelligent maintenance technology to promote plant service businesses.

High-Precision Program Recommendation Technology for Value-Added Digital Audiovisual Appliances

ORIHARA Ryohei/MURAKAMI Tomoko/SAKAMOTO Noriya/HORIGUCHI Takeo

With the dawn of the era of full-scale multichannel TV broadcasting, the function of program recommendation will play a vital role in digital audiovisual appliances. Program selection is an expression of a user's individual preferences and sensitivity. It is therefore a bold decision to allow a machine to make program decisions, because the user is relinquishing the right to choose programs that promise the best use of finite leisure time. Although users may understand that in reality it is impossible for them to make program selections by themselves after examining all of the available programs, there is still a psychological barrier that is difficult to overcome unless they can fully rely on the machine.

Toshiba has developed a high-precision recommendation system that makes TV program selections based on artificial intelligence technologies, especially probabilistic reasoning technology. The results of experiments with general viewers showed that the functioning of the system is meaningful and appropriate.

"Ubiquitous Service Finder"—A Framework to Identify Relevant Web-Based Services for Various Appliances

KAWAMURA Takahiro/NAGANO Shinichi/INABA Masumi

To assist the development of service-providing businesses in the manufacturing sector, Toshiba is proposing a framework called "Ubiquitous Service Finder" to identify relevant Web-based services for various appliances. "Ubiquitous Service Finder" uses ontology-based contextual cues to find the most appropriate Web-based services. Application models were studied to demonstrate technological possibilities for the development of service-providing businesses or value-added appliances with easy access to Web-based services.

Data Exchange and Management Services Adding Value to Industrial Products

ODAKE Yasutaka/MURAYAMA Hiroshi/OGAWA Masahiro

Business-to-business (B2B) electronic commerce via the Internet has become highly popular in various business areas because it offers instant procurement with reduced costs. Product specifications, which were formerly distributed in the form of paper documents, are now obtainable from the Internet. The data are exchanged on the Internet using communication technologies that conform to the requirements of the International Organization for Standardization (ISO); i.e., the ISO 13584 standard.

Toshiba has been working on the development of the industry standards and the data exchange system from the very beginning. This system is now being used to store procurement specifications or distribute product specifications. In addition, the ISO is now discussing the ISO 8000 standards for the Industrial Data Quality Management System, emphasizing the importance of the quality of data exchanged.

Knowledge Management Consultation Service for Effective Value Creation

NAKAYAMA Yasuko/UMEKI Hideo/MIZUHARA Toru

Toshiba has developed a new consulting methodology that enables a company to manage and utilize its accumulated knowledge as a source of enhanced competitiveness and effective value creation. This methodology facilitates the extraction of important knowledge, such as expert know-how, design intentions, and lessons learned from failures, to develop a consulting process that will be helpful in various business situations. The consulting process consists of the following four steps: (1) definition of problems and goals, (2) clarification of knowledge resources, (3) assessment of knowledge utilization, and (4) establishment of a relationship between knowledge and business processes.

Feature Articles

910T W-CDMA Phone

HASHIMOTO Junichi/AISAKA Hideki/SATO Arata

Toshiba has been developing third-generation (3G) handsets for Softbank Mobile Corp., formerly Vodafone K.K., while many operators have been shifting their services to 3G cellular phones. All of the phones released up to the present time have followed the Vodafone global user interface (UI) to match the global convergence models.

We have now launched the 910T wideband code division multiple access (W-CDMA) model, a new type of handset that is more attractive to the Japanese market, to coincide with the introduction of mobile number portability (MNP) in Japan from October 2006. The 910T model corresponds to Softbank's new 3G services, and is equipped with 1 GB of internal memory and features music functionality with a Bluetooth stereo headset. Its 2G-like UI, with which Toshiba has been receiving high evaluations from users, is expected to attract an increasing number of users to this new 3G phone.

Pedestrian Traffic Measurement System Using Computer Vision

BABA Kenji/ENOHARA Takaaki/YUASA Yuichiro

The long-term measurement of pedestrian traffic, such as the number of people walking along public roads or visiting facilities, has been difficult because it has mostly depended on human vision. An additional problem is that the accuracy of measurement often severely declines in densely crowded situations due to limited tracking capability.

Toshiba has developed a pedestrian traffic measurement system applying image processing technology. A field trial confirmed that the measurement accuracy exceeds 98% in a densely crowded situation. This system can be used to obtain information of value to the retail trade, such as the number of customers visiting or their behavioral patterns during visits, to determine marketing strategies.

Advanced Reactor Water Cleanup System with High-Temperature Electrophoresis Demineralization

Process as Alternative to Ion-Exchange Resin Process

MONIWA Shinobu/SEKI Shuji/YOTSUYANAGI Tadasu

The ion-exchange resin process has been widely applied to reactor water cleanup systems to remove impurities from the water used in boiling water reactors (BWRs).

Toshiba has developed a high-temperature electrophoresis demineralization process as an alternative to the ion-exchange resin process for an advanced reactor water cleanup system. Since the new process uses only inorganic materials, high-temperature and high-pressure water can be fed directly to the system. The new system was confirmed to remove ions with high efficiency in a performance test using high-temperature and high-pressure water simulating BWR water. The advanced reactor water cleanup system will be greatly simplified because heat exchangers and resin-handling equipment are not required. It will also be economical due to reductions in heat loss and resin waste.

Radio Source Visualizing System

KAMIMURA Yukihiko/SHIMOMAKI Hirokazu

Radio waves are playing an increasingly vital role in people's lives with the popularization of mobile phones and wireless LAN systems.

However, the radio wave usage environment faces the threat of interference or denial of service, which may be produced by unlicensed and unlawful radio stations.

Toshiba has developed a portable radio source visualizing system in response to the government's call for assistance in effective monitoring of illegal radio waves. This system, which indicates suspected sources of radio wave emissions in a monitored area, is more compact and can monitor a wider range of radio waves than conventional systems. As a result, it is expected that unlicensed radio stations will be able to be found more easily.

Energy-Saving Technologies for Advanced Air-Conditioner Inverter System

ENDO Takahisa/NUKUSHINA Harunobu/SHIMIZU Shinya

Following an assessment review of the Energy Conservation Law, the index of the energy-saving guideline for air conditioners has been changed from the coefficient of performance at the rated operation to the annual performance factor, which is closer to the conditions of actual use. This change requires running efficiency at low output power to be improved, which can be realized by the development of an advanced inverter system.

In response to this requirement, Toshiba applied a sensorless vector control method to the fan motor drive system of the indoor unit for the first time in the industry, to achieve low power consumption. We also adopted a metal-oxide semiconductor field-effect transistor with a super junction structure (SJ-MOSFET) as the switching device for the compressor motor of the outdoor unit. This involved the development of Smart PRE Switching™, a technology to drive switching devices that optimizes inverter efficiency at low output power.

GR-W45FS High-Efficiency and High-Capacity Refrigerator

UCHIDA Yoshihide/SAKUMA Tsutomu/KOGA Koichi

Toshiba developed and began sales of Japan's first electric refrigerator in 1930. Since then, we have introduced a succession of new refrigerator technologies that have improved food storage performance as well as usability, energy consumption, and environmental friendliness. In 2005, we launched the GR-W45FB model refrigerator on the market as a commemorative product marking the 75th anniversary of Toshiba refrigerators.

We have now developed the new GR-W45FS refrigerator as a further evolution of the previous model. Its main features are (1) improvements in the cooling performance and capacity realized by high-efficiency twin-cooling technology as well as a newly designed cool air flow passage and heat insulation structure; (2) a cool air purifying function that employs "nano hikari plasma" to deodorize and sterilize the cool air and to decompose ethylene gas; and (3) advanced usability with flat LED lighting that does not protrude into the storage compartments, and an electrically operated touch-type opening and closing door.

DWS-600A Automatic Dishwasher with Improved Steam Generator

ARAKAWA Toshio/SUGIMOTO Yasuko/SATO Nobuteru

Automatic dishwashers have become increasingly popular and are now installed in approximately 20% of Japanese homes, with consumers citing requirements such as "cleaning dishes hygienically," "quickly clearing up dishes," "saving time spent on housework," and "saving water utility fees" as reasons for using them. To meet these user needs, manufacturers of consumer electronic products have been supplying dishwashers to the market with improved detergency, user friendliness, and energy saving.

Toshiba released the DWS-600A automatic dishwasher on the market in July 2006. The DWS-600A model features higher detergency, steam washing, and shortened washing time.

Frontiers of Research & Development

Nanocomposite Insulating Materials for Environmentally Friendly Heavy Electrical Equipment

Computer-Aided Virtual Manufacturing for Robust Design of Nano-Scale Devices