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Special Reports-1

New Technology: AV Notebook PC

There has been an increase in various types of high-definition audiovisual (AV) contents in recent years due to the penetration of broadband Internet and digital broadcasting to the home. As a result, the demand for personal AV devices with network functions has been rising.

Toshiba has developed the Qosmio AV notebook PC featuring high-definition video quality and ease of use, by unifying AV technologies based on notebook PC technologies. It is necessary to further develop high-definition video technologies, digital broadcasting technologies, home network technologies, high-definition image technologies, and copy protection technologies for digital contents as key future technologies for AV notebook PCs. It is also necessary to clarify customer segments and customer values by market analysis for future differentiation of the AV notebook PC.

The Qosmio AV notebook PC incorporates the functions of various digital audiovisual (AV) equipment, including an LCD-TV and a DVD recorder, in a notebook PC.

Toshiba has utilized its advanced video technologies to realize differentiating technologies in the Qosmio such as a high-quality TV tuner and QosmioPlayer software, which allow TV, DVD, and CD operations to be performed without starting the Windows® system; the QosmioEngine, which provides high quality video processing functions; and QosmioUI, an AV integrated utility.

Toshiba has developed the new Qosmio AV notebook computer under the concept of digital convergence, providing a "four-in-one" experience with TV, audio, DVD recorder, and PC functionality along with high display quality and audio performance.

The technologies featured by the Qosmio are the QosmioEngine with enhanced video performance, a high-video-capability TV tuner, and an ultrabright 600 cd/m^2 15-inch Clear SuperView LCD. Moreover, harman/kardon® stereo speakers add superlative audio quality. The new TV tuner, LCD, and speakers enable the Qosmio to achieve better performance than existing models under the severe size and power consumption constraints of notebook computers.

The Qosmio AV notebook PC is equipped with a bright display comparable to that of an LCD-TV, video processing hardware, an extended-definition TV tuner, and a pair of large-diameter speakers. From the hardware standpoint, Toshiba's years of experience and knowledge of video processing and PC development have been a great asset in the development of the Qosmio.

On the other hand, an AV notebook PC must be accessible and easy to use like traditional consumer audiovisual electronics. Therefore, for the Qosmio we have developed QosmioUI and QosmioPlayer, both of which are products of our industry-leading software technical know-how. Additionally, through effective cooperation with outside developers, we have implemented external AV applications that have been customized to maximize the functional capabilities of the Qosmio.

The infrastructure for broadband networks has been developed throughout the world and digital audiovisual (AV) media such as recordable DVD players are becoming widely disseminated. Many people wish to enjoy AV contents and TV programs on their PC. Already, more than half of the desktop PCs manufactured come with a TV tuner, and some notebook PCs are also similarly equipped.

Toshiba announced the Qosmio AV notebook PC equipped with a TV tuner in July 2004. It displays high-resolution video images on its screen. The high quality of the pictures displayed by the Qosmio is supported by both hardware and software technologies.

In recent years, image information in the home has become increasingly digitized. PCs with a built-in TV tuner and hard-disk video recorders have consequently become popular in the home. In such a situation where various digitized audiovisual (AV) contents are separately stored in individual recording devices, demand for the networking of these contents is expected to significantly grow.

To meet these needs, Toshiba has developed the Qosmio AV notebook PC and a wireless TV tuner that allow interactive wireless connection. These devices can realize a digital AV home network environment with wireless network technology.

Special Reports-2

Thermal Power Plant Technologies for Overseas Markets

Toshiba was well positioned to participate in the boom in the United States market that began in the late 1990s. As a result of a collaborative effort by its sales, engineering, and marketing sections, Toshiba was able to offer a number of standardized steam turbine generator (STG) designs for combined-cycle (CC) application. This allowed us to offer more aggressive pricing, performance, and delivery terms to customers. The competitive advantage resulting from the standardized design effort enabled Toshiba to capture a market share of more than 30 % (No. 1) in 2003 in the United States.

Most of the thermal power plants in Eastern Europe have been operated for more than 20 years, and many have been suspended from operation or derated due to severe deterioration. These power plants therefore constitute a large market for the rehabilitation business.

As a manufacturer and engineering/procurement/construction (EPC) contractor, Toshiba is participating in this market utilizing its extensive experience in this field throughout the world. Recently, a rehabilitation project commenced in Romania and Bulgaria.

The field of turbine generator rehabilitation for overseas markets is characterized by the various types of problems faced by power plant owners in the operation and maintenance of aging generators.

In order to offer solutions that are appropriate for each need, Toshiba provides a variety of technologies such as the high thermal conductivity (HTC) insulation system, water leak detection by the potential mapping test (PMT), rotor maintenance with the high-pressure/high-velocity oxygen fuel process, and other analysis technologies. These technologies demonstrate our capability to offer optimal solutions for turbine generator rehabilitation in the after-care market.

Demand for the application of high-performance distributed control systems (DCS) to large-scale power generation/desalination plants has increased remarkably in recent years, particularly in the Middle East.

Toshiba has significantly expanded the functions of the TOSMAP-DS$_{TM}$ DCS for thermal power stations and launched the DCS business in this market. Our newly developed intelligent I/O, nonvolatile RAM CPU, and multipurpose gateway have established a high-performance control system lineup for large-scale plants in the TOSMAP-DS$_{TM}$ series.

Japanese electrical utilities have recently been suppressing the construction costs of new thermal power plants as well as postponing plant construction schedules. Against this background, the engineering, procurement, and construction (EPC) business has become even more important than before.

Toshiba's concept of EPC is lower costs, shorter construction periods, and high quality. The construction phase includes installation of equipment, connections by welding and/or cabling, repeated site tests, and handing over of the plant to the customer. During these processes, several aspects are emphasized including local subvendor selection, reduction of design changes and additional modifications at the site, adherence to the schedule, and ensuring the quality of the plant. The same approach is also applied to our overseas plant rehabilitation service and scrap-and-build projects.

Toshiba provides a remote monitoring and diagnostic service for overseas thermal power plants, applying information technology to support the customer in supervising normal operations and solving problem situations. In this service, the turbine vibration values, process values, and status of controllers are monitored. Toshiba is therefore able to provide plant condition reports for normal operations, propose improvements to plant equipment, and offer prompt support to the customer in the event of a problem occurring.

Feature Articles

Toshiba has proposed a novel approach for a dramatic increase in the drivability of Schottky-source/drain MOSFETs (Schottky barrier transistors: SBTs). The dopant segregation (DS) technique is employed, and a significant lowering of the Schottky barrier height is demonstrated. DS-SBTs fabricated with the current $CoSi_2$ process show comparable drive current and better short-channel-effect immunity, compared to the conventional MOSFET. The DS-Schottky junction therefore shows promise as a source/drain for advanced MOSFETs.

Toshiba has developed a 24/36 kV solid-insulated switchgear (SIS) as the next-generation type switchgear. This switchgear is smaller and lighter than the cubicle type gas-insulated switchgear (C-GIS), in addition to being free from SF_6.

We have been generally using C-GIS for medium-voltage switchgears up to now. The use of C-GIS contributed to the minimization of size because of the higher dielectric strength of SF_6. However, SF_6 was placed on the list of greenhouse gases under the Kyoto Protocol in 1997. This resulted in demand for a switchgear that uses no SF_6.

The supercritical-water-cooled reactor (SCWR) is regarded as a promising future nuclear reactor due to its prominent advantages of high thermal efficiency, system simplification, R&D cost minimization, and flexibility of core design. In response to the growing demand for advanced nuclear systems, a Japanese R&D project involving cooperation between universities and nuclear reactor plant manufacturers commenced in 2000 with the aim of providing technical information essential for demonstration of an SCWR system. The development of materials was designated as one of the important items in this project to demonstrate the viability of such a system.

Toshiba selected candidates from among commercial alloys, evaluated them, and obtained some promising candidate materials. Furthermore, good performance results were obtained for materials developed from those candidate materials. In the future, we plan to build up a cooperation program with overseas research organizations aiming at verification of the SCWR system through an international program.

Frontiers of Research & Development