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Special Reports

Evolution of Notebook PCs for Business Use

Prospects for Business-Use Notebook PCs toward the Ubiquitous Societyt
SANADA Tsutomu

Trends in Notebook PC Market
KUNII Shimpei
According to the latest forecast, the share of notebook PCs in the U.S. and European PC markets will exceed 50 % in 2008. The widespread dissemination of notebook PCs signifies the arrival of the ubiquitous society, and the degree to which they are appropriately utilized is beginning to have an effect on the results achieved by business users.

Toshiba has recognized the importance of increasing productivity for end users and improving operating costs, thanks to the valuable opinions gathered from corporate users. We are therefore proposing notebook PCs providing higher user value for business customers. New products having enhanced durability and security were released in early 2005, embodying the results of our research and development efforts to realize notebook PCs with higher value.

Design and Evaluation of Thin and Light PC Chassis and Printed Circuit Boards
NAKAJIMA Yuji / YAMADA Keiko
The ultracompact libretto U100 and ultrathin dynabook SS SX notebook PCs were developed as commemorative models for Toshiba's 20th anniversary in the notebook computer business. The structural design of thin and light PCs involves greater challenges due to their weaker chassis, more difficult manufacturing process, and less efficient thermal diffusion. These issues were solved by applying layout design, collaborative design with printed circuit board computer-aided design (PCB-CAD) and mechanical-CAD, structural analysis using computer simulation, and PCB strain measurement.

The libretto U100 and dynabook SS SX join Toshiba's "Thin & Light PC" lineup along with the robustly designed dynabook SS MX and dynabook SS LX models.

Durable Design Technologies for Thin and Light PCs
KAWAMURA Noriyasu / NAKAMURA Koj / MUKAI Minorui
With the increasingly widespread use of portable PCs, demand has arisen for the protection of PCs and the data contained in their hard disk drives (HDDs) against unexpected shock. In response to this demand, Toshiba has developed durable design technologies and applied them to the new dynabook SS MX and SS LX models without compromising the "Thin & Light" design concept. These durable design technologies include an HDD protection system with a built-in three-axis acceleration sensor, simulation-aided design for shock protection structures, and chassis design with rubber padding unit supports.

Printed Wiring Board Technologies for Thin and Light PCs
KOGA Yuichi / HAPPOYA Akihiko / YAMAMOTO Nobuhiro
In the field of thin and light PCs, minimization of the printed wiring board (PWB) area is indispensable. Even when products are compared with those in the same category from several years ago, new elements such as enlarged chip sets and the addition of a cooling mechanism are now being incorporated in PWBs while reduction of the mounting space is progressing.

Toshiba has developed a high-density parts mounting technology that realizes a low loss stack via PWB and narrow part, as well as a ball grid array (BGA) table reverse side mounting technology. These technologies have been adopted in the dynabook SS SX/190 and libretto U100 notebook PCs. The PWB area in these models is less than 70 % that in conventional models.

TOSHIBA RAID - RAID Technologies for Notebook PCs
SUZUKI Noboru / KURASHIGE Takehiko / ARAMAKI Yasunori
Toshiba has enhanced its MAGNIA$_{TM}$ ATA RAID technology for notebook PCs and implemented the functions of a redundant array of independent (inexpensive) disks (RAID) on the Portege S100 (dynabook SS LX) and Qosmio G20 models as TOSHIBA RAID. The Portege S100 is the first RAID-powered product under 2.5 kg in the lightweight mobile category.

RAID creates a pool of data storage space from several hard disks to provide redundancy and/or performance. The Portege S100 provides RAID-1 (mirroring), while the Qosmio G20 provides RAID-0 (striping) and RAID-1. TOSHIBA RAID actualizes new added value for notebook PCs, realizing "Safety and Security" as well as "Surprise and Sensation" in line with Toshiba's new concepts for notebook PCs.

Security Technologies for Business Notebook PCs
MATSUOKA Yoshio / UEDA Kunio
Information security is currently attracting considerable attention, especially in Japan with the recent enactment of the Personal Information Protection Law. PCs used in the corporate environment contain huge volumes of personal information. As a result, the risks of the leakage of such information have become so high that the existence of the corporation itself may be threatened, through having to pay compensation for damages, for example. In the case of business notebook PCs, it has therefore become mandatory to provide customers with the security of having clear ways to protect information, because the greater portability of these PCs also increases their vulnerability to theft and loss.

Utilizing its long-accumulated in-house technologies in both BIOS and application software, Toshiba has been aggressively strengthening information security while taking ease of use into consideration. Among the information security technologies that we have developed are protection against malicious alteration of a computer's BIOS, BIOS password, hard disk drive password, secure digital (SD) card token, device lock, fingerprint authentication, and handwritten signature log-on.

Feature Articles

Extendable Product Traceability System from Small Start
OZAKI Satoshi / DOI Yusuke / WAKAYAMA Shirou
A cost-effective and easy way to introduce a product traceability system is to start from a small system and gradually extend it to large-scale systems. Traceability systems used in past field tests are not suitable for large-scale deployment because they use a single, centralized database.
This paper describes a gradually extendable traceability system proposed by Toshiba that employs distributed databases and ID-hash values. We have confirmed the proper operation of this system with a trial system, and plan to analyze its qualitative behavior in scale extension through large-scale experiments.

Optical Diffraction Acoustic Sensor Applying MEMS Technology
SUZUKI Kazuhiro / FUNAKI Hideyuki / NARUSE Yujiro
Intelligent acoustic sensors that can extract a specific voice in a noisy environment are required as a voice interface for IT equipment. Toshiba has proposed a novel acoustic sensor applying microelectromechanical systems (MEMS) technology, called the "MEMS optical microphone," which detects the acoustic wave through changes in the optical diffraction pattern of a grating diaphragm. Using compact optical microphones fabricated with a complementary metal-oxide semiconductor (CMOS) process and micromachining technology, we verified various functions useful for voice recognition such as directivity, phase detection, and noise suppression.

Development of New Controller for Robotic Forceps Based on Ergonomic Studies
TOMIOKA Kei / JINNO Makoto
Endoscopic surgery is highly regarded as a minimally invasive type of surgery. Toshiba has been developing robotic forceps as a functionally enhanced apparatus for laparoscopic surgery. To increase the usability of the master grip (controller) of robotic forceps, iterative design processes based on ergonomic studies were applied to its development. User requirements for robotic forceps were captured by motion analysis of video recordings made of experimental operations using existing robotic forceps. Based on these user requirements, the usability concept for a new controller was established and a preliminary prototype was developed equipped with three separate operational devices to control the gripper of the forceps.

The acceptability of the usability concept of the prototype was verified through user testing. Moreover, by means of evaluations iteratively carried out with users, small modifications were made to the prototype to further improve usability.

Loss and Cooling Analysis for Downsized and High-Efficiency Air-Cooled Turbine Generators
KABATA Yasuo / FUJITA Masafumi / KAKIUCHI Mikio
The capacity range of air-cooled turbine generators has been expanded from the standpoints of system simplification and easy maintenance. Two important topics in the field of air-cooled generators are downsizing and loss reduction.
Toshiba has developed a multi-pitch ventilation duct system to optimize air flow distribution in the generator, and a new stator coil structure that minimizes electrical losses in the stator coil. These newly developed technologies have achieved both weight reduction and high efficiency for 150 MVA-class air-cooled turbine generators.

BI-1200 Banknote Quality Inspection Machine
KINOSHITA Kazunori
The increasing incidence of counterfeit banknotes worldwide has become a major social issue in recent years. It is extremely difficult to distinguish between counterfeit and authentic banknotes, because each type of banknote has different printing quality. As a result, many counterfeit banknotes have been appearing, creating chaos on the social and economic fronts. It is therefore important for all printing bureaus throughout the world to supply high-quality brand-new notes as a measure against counterfeiting.

Toshiba has developed the BI-1200 banknote quality inspection machine equipped with detectors having higher resolution, thus providing the high level of inspection performance required by printing bureaus worldwide.

Frontiers of Research & Development

Ultra-Wideband Small Antenna Technology
Power System Analysis Technology for Evaluating Distributed Generation Systems Interconnected with Power System
Simulation Technologies for Direct-Drive Motor (DDM) as Traction Motor