

AfterWords

A century of magnetic recording

Just as the invention of the printing press in the 15th century forever changed how we communicate, the development of digital magnetic recording in the 20th century has profoundly affected how we record, store, and disseminate information. Financial services, airline reservations, and perhaps most significantly, the Internet are supported by huge on-line real-time databases.

The year 1998 marked the 100th anniversary of the magnetic storage industry. And while its birth took place in Denmark, there is no better place to celebrate the impact this industry has had than in the heartland of computer data storage — Silicon Valley.

Leading the celebration at Santa Clara University was SCU's Institute for Information Storage Technology (IIST) and the Center for Science, Technology, and Society (CSTS). Together they hosted a December conference on Magnetic Recording and Information Storage: Technological Milestones and Future Outlook. IBM, Fujitsu Computer Products of America, Adaptec, and IDEMA co-sponsored the conference, which more than 130 information technology professionals attended.

Kicking off the day's activities, CSTS Director Jim Koch put the recording industry's accomplishments into perspective by noting that in 1855 it cost five cents to send one word from Philadelphia to St. Louis by telegraph. Today it costs four-and-a-half cents to store one-and-a-half million bytes of information that can be sent anywhere in the world with a click of a mouse — virtually for free.

Presenters from the industry assessed the impact of digital magnetic recording and direct-access storage on information processing applications, including the Internet, the disk-drive industry, and future technology.

Keynote luncheon speaker Al Shugart, founder of Seagate Technology, recounted the early days of the industry, which were often more low than high tech. He recalled that on the first disk drive, the RAMAC, the disks were coated by pouring iron oxide paint from a Dixie cup onto a spinning platter.

Al Hoagland, IIST director, reviewed the paradigm shift in magnetic recording to direct access data storage brought about by the advent of the electronic digital computer in the 1940s, when a critical need developed for rapid access to digital data. Until then, the focus was on analog sound recording. While early computers relied on punched cards and paper tape for data storage, magnetic recording quickly became recognized as the best technology to meet the storage needs of computers. And as the personal computer emerged commonplace in both homes and offices around the world, the need for memory and storage soon became insatiable.

Magnetic recording is effectively replacing paper for recorded data and e-mail. Today, the technology is advancing at its most rapid rate ever, making even more data-intensive applications possible, such as digitally recorded images replacing photographic film.

Innovations in every aspect of magnetic disk drives have driven up storage density at a phenomenal rate. Since 1991 areal density has advanced at a compound annual growth rate of 60 percent per year. And industry experts believe that by taking different approaches to scaling magnetic recording, hard disk-drive technology should be extendible by another factor of 100, ensuring the industry's dominance well into the new millennium.

TIMELINE

1898	Danish engineer Valdemar Poulsen invents the Telegraphone, the first telephone answering machines employing an electromagnet moving along a length of piano wire.	1957	IBM releases RAMAC, first commercial disk drive, storing 5 megabytes of data and featuring a pressurized air-bearing head.
1920	Between 1920 and 1929, various inventors create steel tape and wire recording devices such as dictation machines and radio studio recorders.	1961	IBM Disk Drive launched with 50 megabyte capacity — prototype of future generations of disk drives, having one head per surface and using flying heads.
1928	Austrian inventor Fritz Pfelemer creates first magnetic tape by gluing pulverized iron particles to a strip of paper.	1973	Floppy disk introduced.
1933	The Magnetophone, using cellulose magnetic tape, invented in Germany.	1980	Seagate Technology launches first 5.25-inch hard drive for desktop computers.
1947	Singer Bing Crosby contracts with Ampex Corp. to market its broadcast-quality audio tape recorder.	1983	3.5-inch hard drive introduced.
1948	UC-Berkeley Computer Project creates first magnetic drum for storing binary computer data with capacity of 800 bits/in ² .	1991	Hard drive shrinks to 1.8 inches.
1951	UNIVAC ships first computer using magnetic tape storage system.	1998	Disk drives the size of a quarter are made available that capture 320 megabytes of data. Areal density is projected to continue to increase at a 60 percent compound annual growth rate.