

StorageTek put under pressure to create winner

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LOUISVILLE — The managers and engineers at Storage Technology Corp. are finding themselves in unfamiliar positions these days.

Not only is StorageTek reporting red ink after a decade of explosive growth and profits, it also is leading the way in a major product technology. That's a turnabout, since StorageTek has made its mark as a follower, turning out cheaper and better versions of IBM tape and disk data storage systems.

The role change involves StorageTek's 7600 optical data storage system: a \$130,000, high-capacity machine that, in time, could add billions of dollars to StorageTek's revenues. But in the near term, the program has further significance. After the well-publicized failure of its mainframe computer project earlier this year, StorageTek needs a winner.

A successful optical drive would bring home a big victory.

Also, StorageTek is the only company that has announced a high-capacity optical storage system. While several companies are working on optical drives for small computer systems, many in the industry are looking to StorageTek as a trail blazer.

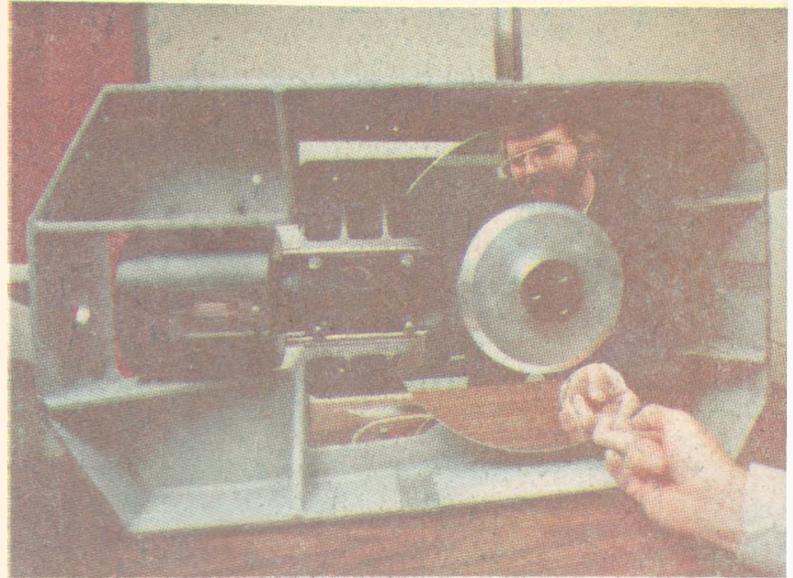
"They are clearly the pioneer," says Raymond C. Freeman Jr., president of Freeman Associates, a Santa Barbara, Calif., research firm that recently released a 295-page survey of the optical storage industry. "They are single-handedly trying to develop the high-end market."

At present, though, the journey is a cautious one. Tight for cash and wary of introducing a product prematurely, StorageTek said last May that it would delay volume production of optical drives until the first quarter of 1985.

Yet it appears that volume production won't begin until at least the second quarter — or later. The company says it hopes to make a couple hundred drives through the first quarter, and more than 1,000 next year.

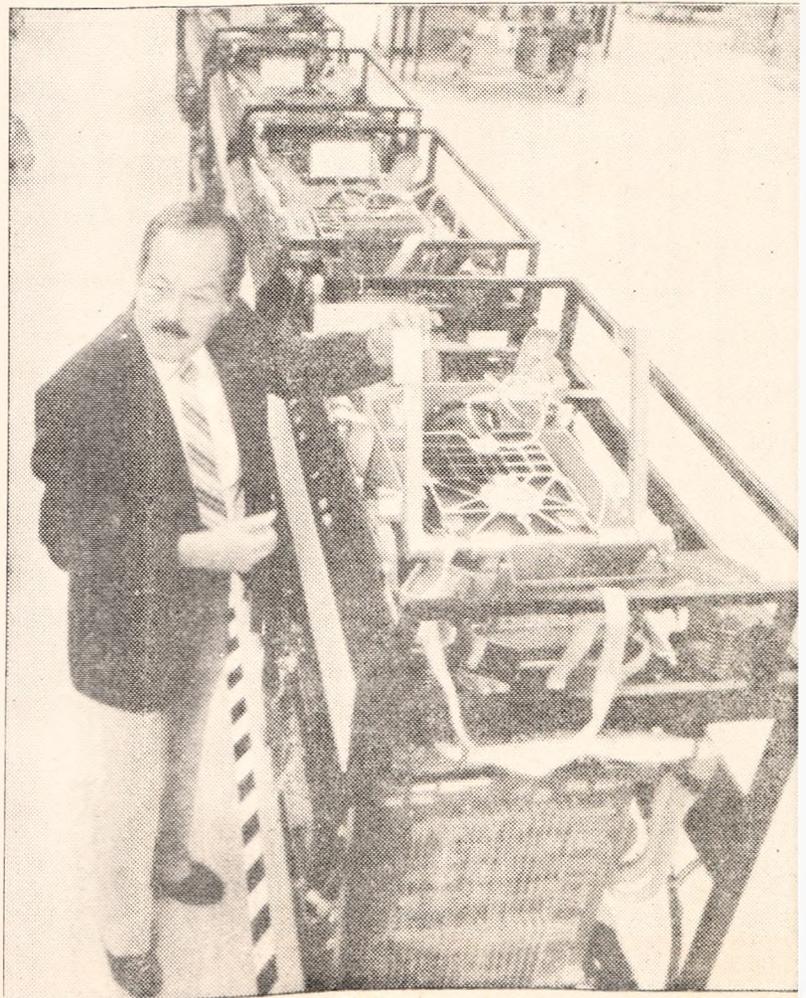
The delays have frustrated some key members of the optical development team. A handful — seven, by the count of one former high-level engineer — have left in the last six months, some to start their own companies.

"Certainly there's some level of frustration when you fail to meet your original commitments," said Juan Rodríguez, one of the four



The Denver Post Duane Howe

A StorageTek engineer examines a model of the optical system.



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Juan Rodríguez, head of the StorageTek optical disk program, and a



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StorageTek feels pressure of need for winning drive

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founders of StorageTek and head of the optical program, in an interview last week with The Denver Post. "I think we all feel personally dissatisfied with not having done what we thought we were going to do, in the time schedule we were going to do it in."

Still, StorageTek officials say the optical program bears no "show-stopper" problems. "We're in pretty good shape," Rodriguez says.

An automated production line, nicknamed Barbara, should be ready in weeks to begin producing the round, album-like platters used with the system. StorageTek recently signed an agreement whereby Du Pont will become a second source for the media. In another area of the Longmont optical facility, about a dozen drive boxes await completion. The operation currently employs 500; that will eventually rise to more than 2,000.

Demand appears strong for a high-capacity optical drive among banks, government agencies and others that need to store massive amounts of data. StorageTek officials say they have standing orders for more than 1,000 machines, without a concentrated sales effort.

"The seismic community is chafing at the bit to get one of these," says Edward S. Rothchild, who publishes the Optical Memory Newsletter in San Francisco. StorageTek's first test unit went to the National Center for Atmospheric Research in Boulder, which presumably could use an optical system to store satellite data.

While the current optical market is minuscule, Freeman estimates that by 1990 sales will total nearly \$7.5 billion. At that point, he says, low-capacity machines — those with data transfer rates of less than one megabyte, or million characters, per second — should account for almost 2 million units sold, compared to 110,000 units of high-capacity machines with transfer rates of more than 2 megabytes per second.

But high-capacity systems should lead in 1990 dollar sales, with a market of about \$3.4 billion. Freeman says.

StorageTek is addressing a market that currently is served by a variety of media, including magnetic tape and disk, microfilm and paper. Rodriguez figures that the optical disk drive can replace all of these to some extent. He cites a French government finding that 2 percent of all data is stored on magnetic tape or drive, 3 percent on microfilm and 95 percent on paper.

The advantage of optical systems lies in their lower cost per byte, or character of data, than magnetic disk, plus the ability to get stored data faster than tape machines.

The faster access time comes because optical drives, like magnetic disk drives, are so-called random access systems. In a typical sequential system, such as a tape drive, the tape must be advanced or rewound to the spot where the desired information is stored before it can be retrieved. A disk system simply sends an electronically sensitive "head" to the point on the spinning platter where the information is kept, then reads it into the system.

In large data processing centers, frequently used records are stored on disks, while other data goes onto tape. When records or other data are needed, the tape is put on a tape player and transferred to a disk system or computer.

"One of the problems in a sequential device is that the more data you have on it, the more time it takes you to get to that data," Rodriguez says. That's presumably why, when IBM recently introduced a new tape system with increased recording densities, it also shortened the length of the tape on each cartridge.

Optical disks are stored like tapes, but can be read randomly rather than sequentially. In the StorageTek machine, three lasers are used to position a reading mechanism, burn holes into a heat-sensitive layer on the disks and then read the pattern of those holes by bouncing a light off the shiny surface that shows through each hole. The system is non-erasable, meaning once data is burned into a disk, it is there for good.

Each album-sized optical disk used in the 7600 system will store as much data as 30 or more reels of magnetic tape — the total capacity of a disk is four gigabytes, or four billion characters of data. One square inch of a StorageTek optical disk can store as much data as 8,000 pages of 8½-by-11-inch paper.

Indeed, some in the industry believe that StorageTek's biggest hurdle at this point is not technical, but how to adapt the massive data storage to everyday use in data processing centers.

"The system culture, the user culture, isn't used to thinking in terms of maintaining and accessing such very large data bases," says Freeman.

StorageTek hopes to make the transition easier by using familiar interfaces with computers and other data storage devices. The 7600 system will hook up to a mainframe computer through StorageTek's 8880 controller, a computerized device that monitors the flow of data between storage devices and computers.

The 8880 is the same controller that works with StorageTek's 8380 magnetic disk drives, and will be able to connect up to 16 optical drives and 16 of the 8380 drives to one computer.

Although StorageTek still stands alone in the high-capacity optical field, Freeman identifies 28 companies that are actively developing optical products. Several of them are in Colorado, which has become somewhat of a center for optical growth.

In April, Control Data Corp. and N.V. Philips of The Netherlands announced an optical joint partnership, Optical Storage International. Based in Santa Clara, Calif., the company will keep its research facilities in Colorado Springs and The Netherlands.

Last October, the man who founded the Colorado Springs operation, Steve Popovich, spun off his own company, Information Storage Inc.

The CDC-Philips machine will store 2 billion bytes on each 12-inch diameter disk, and each system will sell for about \$10,000. But most of the optical start-ups are concentrating on the low end of the market, partially because entry there is less expensive.

Information Storage, for instance, is designing a \$600, 100-megabyte optical drive that will use replaceable cartridges and work with small computers. The cartridges will cost about \$60 each, says Marketing Vice President Richard G. Zech.

"We'll probably be selling as much as two-thirds or three-quarters (of volume) to desk-top computer users," he says.