

JETSET STAYS PUT

By LYNN WASNAK

Diconix Inc. could have been located anywhere. But, the firm's top management chose a cornfield near Dayton. The maker of non-impact printers is one of the industry's leaders, and a source of pride for Eastman Kodak Co., its parent.

Want to be an innovator in the Information Age?

Imagine a printer that generates any typeface or illustration at a speed of 110,000 lines per second. Picture it printing multiple colors, on any kind of paper, at a rate of 800 feet per minute. Let's make it a nonimpact printer, so it can print on any shape or kind of material - plastics, cans, textiles, even the surface of a fried egg yolk!

Be sure the printer relies heavily on electronics, so that as the cost of electronics drops, the printer will be ever more affordable. And make the software and precision design so complex it will be extremely difficult for competitors to muscle in on your market.

Sounds like an intriguing piece of equipment, doesn't it? But it's not a vision ... it's a reality. The Diji 2800 ink-jet printer is the flagship product of Diconix Inc. of Dayton. It's the world's fastest printer, and even at a cost of \$1 million per unit, volume producers such as *Reader's Digest*, Sears Roebuck & Co., and state lotteries use this system to generate more than 4 billion pieces of mail each year.

"There isn't anything like it in the marketplace," says David A. Lehman, president of Diconix. A tall, affable man with a background in chemistry, Lehman looks right at home behind his ample desk. This office, gray with plum accents, is bright and airy, like the rest of the 336,000-square-foot facility that opened just a year ago in the Miami Valley Research Park. It houses about 600 workers: a third in research and engineering, a third in manufacturing, and a third in marketing/service/administration.

It wasn't so long ago that Diconix was just a gleam in the eye of James McSwiney, then chairman of Mead Corp. in Dayton. In the mid-1970s, McSwiney hoped to put the slowgrowth paper company in a fastgrowth channel by promoting research into printing technologies.

He assigned 12 scientists to identify the direction of printing technology in the 1980s. They chose ink-jet, long before any major technology-oriented house in the U.S. or abroad had seriously considered the then unproven technology.

Next a team was formed with an even greater challenge: to build the world's fastest printer. "It was a tremendous undertaking," says Lehman. Scientists and technicians were "collected" from a host of countries and companies. Graduates of virtually every major technology house became Diconix employees, including Lehman, who came from International Business Machines Corp.

"This technology is not easy to duplicate, because it requires such a broad array of scientific talent," Lehman explains. Recruits included mechanical and electrical engineers, chemists, physicists, aerodynamicists, and material scientists, among others.

Mead's innovation was a success, but the economy took a nasty twist in the early '80s. Burnell Roberts, who followed McSwiney as chairman, decided Mead should concentrate on its basic businesses.

It was also clear that the right "parent" for a high-tech enterprise like Diconix would be a firm at home with sophisticated technology, with sufficient resources, and an understanding of the complex sciences used in ink-jet research.

After being "up for adoption" for more than a year, and seriously considered by many companies in the U.S. and abroad, Diconix was purchased in 1983 by Eastman Kodak Co., Rochester, N.Y.

Kodak is a very congenial partner, says Lehman, "an American company with a premier reputation in the marketplace, and annual R&D expenditures of more than \$1 billion."

Kodak offered Diconix the opportunity to relocate anywhere it wished, including Rochester, but Lehman politely declined. "There are very few people who understand this special technology. To move it anywhere, even to Cincinnati, would have been to risk losing some of these very critical scientists and engineers," he says.

Kodak did not want to upset what it thought was a winning formula. "It sees this as one of two major printing technologies of the future-laser and ink-jet - and we have the world leadership position in our technology," explains Lehman.

Instead, Kodak built Diconix a new building of its own. This building, reflecting Lehman himself, is designed to promote "intense communication."

Communication is the major secret of successful innovation, Lehman believes. That's why the Diconix facility includes 55 conference rooms and five atriums with expansive stairwells and balconies where people can see and talk to each other freely.

"Sometimes we may sound like the Tower of Babel. But the technology requires very intense interaction between that marketing person, that engineer, that scientist, that manufacturing person. And the more they can communicate and understand one another, the faster they can move," says Lehman.

"We're in an out-and-out race--some people even say a war--with the Japanese for technological leadership," he says. "The Japanese have tremendous skills. They virtually control the whole marketplace in consumer electronics. But they have some weaknesses, and if American companies can capitalize on those weaknesses, we also have the chance to beat them."

Lehman cites the Japanese consensus-driven culture as a weak spot. "The Japanese culture is a very homogenized and group-think type." Before anything is built, a consensus must be achieved. "That takes time, and sometimes clever innovation gets lost because they reduce themselves to the lowest common denominator," he points out.

In contrast, the American culture fosters individual creativity. "We have an opportunity here, if American industry can find a way to innovate faster, and to allow its creative voices to be heard," advises Lehman.

He's doing his best to bring that concept home to Dayton. Diconix throbs with creativity. This year alone, the company introduced ten new products, including the world's smallest ink-jet printer, which fits in a briefcase. "That's almost one new product a month. Their tongues are hanging out," says Lehman of his employees, "but this is the way we have to work to keep ahead."

The company must be doing something right. Despite the intense work pace, it currently enjoys less than a 4 percent annual turnover rate, compared with California high-tech firms, which average 32 percent.

Top talent comes and stays at Diconix partly because of the pioneering aspect -doing something that no one else has done.

A second attraction is the company's freedom and open atmosphere. "Larger companies are more bureaucratized," says Lehman. "Here, they can put their own personal imprint on the company."

Equal status is encouraged. Lehman's name tag reads "Dave" in big letters and first name basis is the rule in this company's culture. "I may be president of the place, but I've just been asked to fulfill a role like everyone else. We're all in this together," he says.

Every effort is made at Diconix to listen to those who challenge tradition. Lehman cites the case of a young, married technician who was still attending night school to complete his college degree. He disagreed with the company's scientists on methods of precise ink refining techniques. "He worked at his kitchen table at night to prove his point.

"We've tried to make a matrix environment open enough so that people can take on the system. This young man did--and he won. We believe we saved \$30 million. So we gave him college scholarships for his two children. "

Diconix puts a premium on the individual "who takes on the bold notion," says Lehman. "We have every individual in this place on some form of incentive, in addition to their salary."

He describes another instance, in the development of the world's smallest ink-jet, the Diconix 150--just two inches high, 11 inches wide, and 6-1/2 inches deep. Instead of taking up to five years for development, as is typical in new technology, this printer went on the market in nine months, from start to finish.

"I wanted our people to create a device that was very small, and we really weren't making much progress," says Lehman. "But one day, one of our young scientists came in with a toilet paper roll, and said, 'I have the answer.' He turned the roll on end, and out popped a couple of batteries He'd put the batteries in the platen. That was as obvious as anyone could think of, but now we hold the patent. This guy, overnight, changed the whole concept of what we were doing. It's that kind of innovation that's the winning course," he says proudly.

The rapid new product development continues, because "We give people a lot of responsibility to do this kind of thing, to take a chance, and we have to recognize that there's always a risk of failure. We're not there to reprimand them if they fail, if they're working in a responsible way. "

The intense communication in this company moves from the top down, as well as bottom up. Twice a year, all Diconix employees meet downtown at a theatre, for a combination of business and entertainment/motivation.

"We discuss every product. We talk about issues of revenue and profit. We feel if the people understand exactly where we are, and where our problems are, that 600 people addressing the problem may get us there faster than only a few," says Lehman.

He also leads a President's Council meeting once a month with nonmanagers. Twelve people, one for every company function, are appointed to serve for a year. "We sit down and talk about issues and problems. I think one of the worst things a company can have is unfounded rumors running around. People waste energy, get concerned over things that are never going to materialize. So they can raise any issue they want. In turn, I raise the issues I want to talk about," he says.

Obviously, the company hasn't solved all its problems, but Lehman strives vigorously to make people feel they are not part of a cold corporation. In a unusual symbolic gesture, each tree on the Diconix grounds is identified with a brass tag, and is dedicated to an employee.

"When they join, it's a symbol to say 'you're growing with us,'" explains Lehman. "The idea came from an employee. At first I thought it might sound hokey. But the more I thought about it, the more I decided it was a nice symbol. Today, some people drive in early so they can park by their tree. Despite the fact that we're not making anything huge out of it, I'll guarantee that the first time a new employee brings the family out here, they show them their tree."

All this people-consciousness is paying off. Though Diconix declines to reveal specific revenues, Lehman says sales have risen by a factor of 10 since he joined five years ago. "We're close to doubling this year, and next year we think we'll double again."

He agrees that it's exciting being in an area of so much growth and potential. Ink-jet technology is very economical for the end user, and improving year by year. It can be used for everything from high volume direct mail production to quality business letters.

Among other new products recently introduced are an office tabletop printer and the Admark III, an ink-jet printing and personalization system with a remote printing head. The latter product can be used in combination with many kinds of printing equipment, including web offset.

In 1981, the value of non impact printer shipments was about \$41 million. By 1985, that figure had reached \$360 million, and by next year, Lehman estimates that \$1 billion worth could be sold worldwide.

Diconix is not the only maker of non impact printers, but this rising market will have significant impact on the company.

Although the venture is only a blip on the balance sheet of its \$11 billion parent corporation at this time, "We expect to have a profound influence," says Lehman.

Kodak's pride in its fast-growing subsidiary is shown by its decision to hold the 1986 shareholders meeting in Dayton, showcasing the Diconix facility.

"We had a lot of attention from the investment community," says Lehman. "It was such a whirlwind," he adds, mentioning an incident he calls "vintage Dayton."

"We had two- to three-dozen CEOs show up for our annual meeting. Dayton's leaders from the academic world, and the foundation and the business world came out to show support, not only for Eastman Kodak, but because they were so pleased that Diconix is part of the community. If they had met in San Diego," says Lehman with a smile, "that wouldn't happen."

Standing outside the sparkling new Diconix facility, it's hard to believe that scarcely two years ago, this Miami Valley Research Park site was a cornfield. Interestingly, James McSwiney, the man who initiated this company, is also one of the primary founders of the research park.

Today, traffic moves steadily on Research Boulevard, despite the need to dodge orange cones and construction vehicles.

Three other high-tech facilities are nearing completion close by, and in an adjacent field, bulldozers dig the shell-like holes for three man-made lakes.

No one could be more pleased about this than Lehman. "Dayton is a town that has gone through some difficult times, especially with its basic industries," he notes, "and the people are very embracing of a new company," he says.

Especially one born and bred here, which had a chance to leave, but stayed to grow.

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(Box) How It Works

There is more than one kind of ink-jet printing technology, but the fastest, clearest and (Diconix thinks) the best is its patented, multiple-array approach to continuous-flow ink-jet printing.

The Diconix method calls for a constant flow or "curtain" of highly refined ink to be forced under pressure through microscopic holes in the printhead. Individual drops are created by pressure waves, and are selectively charged, causing them to move in particular directions. The process determines which drops hit the page, and which are deflected to a special ink catcher for recycling.

A Diconix ink-jet printhead is almost too small to describe. Tiny openings, each about one-third the size of a human hair, are embedded in a scarcely perceptible scratch. The smallest printer, the Diconix 150, has 64 holes in the printhead, releasing five million drops per second. The worlds fastest printer, the Dijit 2800, has 1,200 openings, virtually invisible to the naked eye. It releases about 60 million drops per second, and could print a 500-page book in 30 seconds.

Each color in a multi-color printing has its own dedicated printhead and ink supply. The printhead itself never touches the surface it is printing on. Drop patters are computer controlled, and can theoretically form any typeface, picture or graph, on almost any texture.

"To give you a feeling for the accuracy," says Lehman, "if you stood at the end of a football field, and teed up with a golf ball, and had to drive the golf ball to the other end of the field and hit a target within two-tenths of an inch...that's the precision with which these drops come out. We're becoming an expert in micro-miniature manufacturing."

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