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## **OFS saw value of key preform process**

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**STURBRIDGE-** In 1999, the former SpecTran Corp. applied for a patent on a key process just as Lucent Technologies Inc., looking for production capacity in a booming telecommunications market, was buying the company.

Held up by the acquisition process and questions from the U.S. Patent and Trademark Office, the patent wasn't granted until last year. By then, SpecTran had been sold again - spun off to Furukawa Electric Co. Ltd. of Japan in 2001 after money-losing Lucent decided to shed its fiber and cable operations.

When companies change hands or sell assets, patents and trade secrets can be at risk. Huge investments in research and development may evaporate if new owners don't understand or care about the value of the intellectual property, decide to go in a different direction or buy the company for other reasons.

"The value of intellectual property can easily be lost through neglect, and that general principle applies as much to trade secrets," said James C. Donnelly Jr., a partner with Mirick O'Connell in Worcester, whose practice includes IP litigation.

Nearly 110,000 patent applications were abandoned last year, according to the USPTO. That does not include patents no longer in effect because of expiration, failure to pay fees or deemed unenforceable by a court.

"When assets are sold in bankruptcy it is like a yard sale on a dark and stormy night," said Mr. Donnelly "There aren't too many buyers and most don't understand the value of the assets. And even if you get a buyer who understands the value, he won't bid more than he has to and may not have to bid very much at all."

Happily, that was not the case at SpecTran, now known as OFS.

A key company patent on a method for preparing glass preforms, from which optical fiber is made, has survived troubled times, a depressed market and multiple acquisitions. Company engineers said the compelling nature of their invention and a corporate culture that understood the link between IP and the marketplace helped keep the technology front and center.

Around 1995, OFS said, the industry recognized faster transmission speeds in local

area networks were needed and began to standardize optical fibers for 1-gigabit transmission, or 1 billion information bits per second. This required the use of lasers as sources of transmission instead of light-emitting diodes. But to create such fiber, manufacturers had to overcome a problem known as the "center dip," a defect in fiber and a cause for decreased bandwidth, said OFS.

The center dip didn't matter when information was being carried at slower speeds. But when the source of light that carried information changed from LEDs to lasers, "the way they lit up the fiber was subtly different and the flaw was exposed," said David J. Mazzaresse, who at the time was SpecTran's manager of research and development.

"So the technology of the fiber had to keep up with the change in transmission," he said.

Mr. Mazzaresse and Michael T. Owsiany, whom Mr. Mazzaresse hired in 1997, had been working on a solution to the center dip, but their research moved into high gear in 1998, when Mr. Mazzaresse added George E. Oulundsen III and Timothy F. McMahon II to the team. Chemical engineering graduates of the University of Massachusetts at Amherst, the men share the patent.

Co-founded by an inventor and patent holder, Raymond E. Jaeger, SpecTran had long recognized the value to the company's survival of intellectual property that pushed the envelope and the advantage of quickly getting it to market, said Mr. Mazzaresse. It took less than a year from the start of their work to a patent application for the solution. Technicians monitoring experiments around the clock in a lab with real manufacturing equipment helped speed the discovery, they said.

"That access and the environment allowed us to do a lot of experiments in a short time," said Mr. Mazzaresse.

OFS multimode fiber is drawn from glass preforms whose core rods are the brains of optical fiber, said Durgesh S. Vaidya, technical manager, research and development. From each preform hundreds of kilometers of fiber can be drawn. Fashioned from meter-long hollow quartz tubes on lathes, preforms gain their optical properties through the deposition inside the tube of germanium gas and the application of heat and oxygen. Once the opening in the tube is narrowed, the next step is to convert the tube to solid glass

Mr. Mazzaresse's team found that the gas sulfur hexafluoride, or SF<sub>6</sub>, when flowed through the central duct, could etch the part of the glass layer that contained the center dip, eliminating the defect. Because the gas could peel away defects at a much lower temperature than other fluoride-containing compounds, they were able to separate the etching step from the collapsing step that was done at a higher temperature, OFS said.

Its patent on a "method of collapsing a tube for an optical fiber preform" is for the separation of the steps.

Most other manufacturers were trying to do both steps at the same time, said Mr. Oulundsen. "But if you do this, the process is hard to control, repeatability was low and there would still be defects left," he said.

At the time the men were experimenting, "most optical products didn't require this level of control," said Mr. Mazzaresse.

The discovery of how to remove the center dip through a process that could be controlled, repeated and had fewer parameters allowed SpecTran to not only offer 1-gigabit fiber, but also to be the first company to introduce 10-gigabit fiber. With the technology, the company launched its Laserwave fiber product line that OFS said enables routine 10-gigabit transmission rates in networks that have been installed worldwide.

The technology has also improved the bandwidth on all fiber made in Sturbridge, said OFS.

"It's pretty important technology to OFS," said Daryl Inniss, director of components at RHK Inc., consultants to telecommunications companies. "This is a process that eliminates the center dip in a fiber created using the Modified Chemical Vapor Deposition process." Other companies, such as Corning Inc., use a different process and didn't have to overcome the center dip, he said.

Multimode fiber, used in LANs, makes up about 4 percent of all optical fiber used by the telecommunications industry, said Patrick J. Fay, spokesman for KMI Research in Providence. While demand in North America for multimode has declined from around 1.1 million fiber kilometers in 2000 to about 775,000 km in 2004, demand for laser-optimized, or 10-gigabit, fiber is growing, he said. It represents about 10 percent of multimode demand.

One-gigabit fiber is still the bulk of production in Sturbridge, but demand for 10 gigabit "now it is taking off," said Mr. Oulundsen, who still works for OFS, along with Mr. McMahon. Mr. Mazzaresse has since started a fuel cell company, Logical Fuel Inc. in Warren. Mr. Owsiany works at Mott Corp. in Connecticut. OFS employs under 200 at its 50 Hall Road plant.

When Lucent bought SpecTran, its patents and trade secrets were less of an attraction than its ability to manufacture multimode fiber because Lucent already had a "huge IP portfolio," said Mr. Vaidya. "But Furukawa is a different story. It is known in Japan as a manufacturer and needed the IP to become a global player. The market in Japan for multimode is only high-end fiber, and this patent is more relevant. Intellectual property was an important consideration."

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