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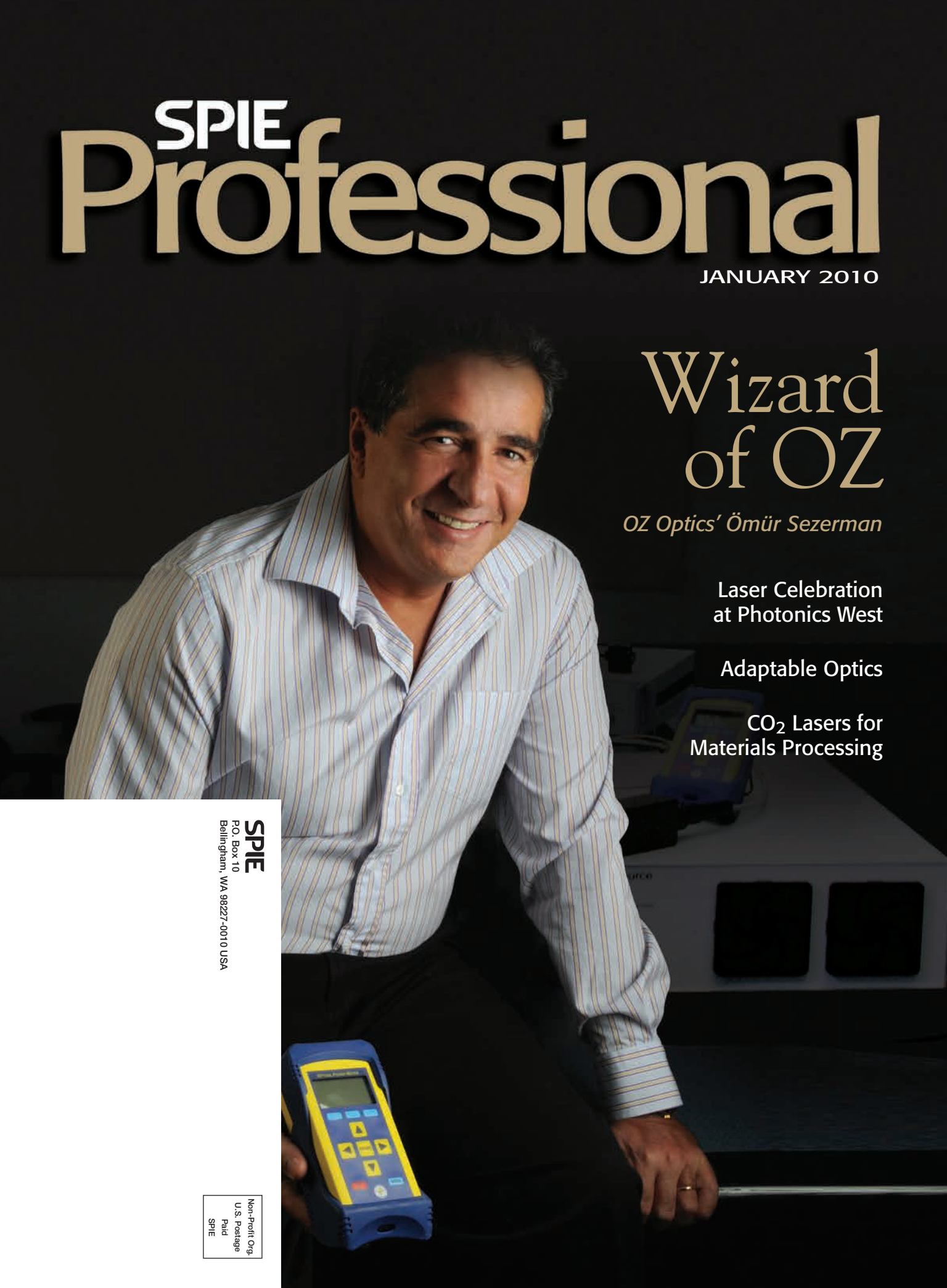
Wizard of OZ

OZ Optics' Ömür Sezerman

Laser Celebration at Photonics West

Adaptable Optics

CO_2 Lasers for Materials Processing



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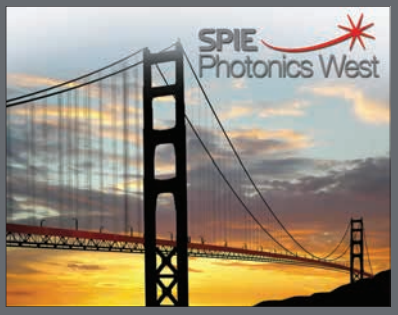

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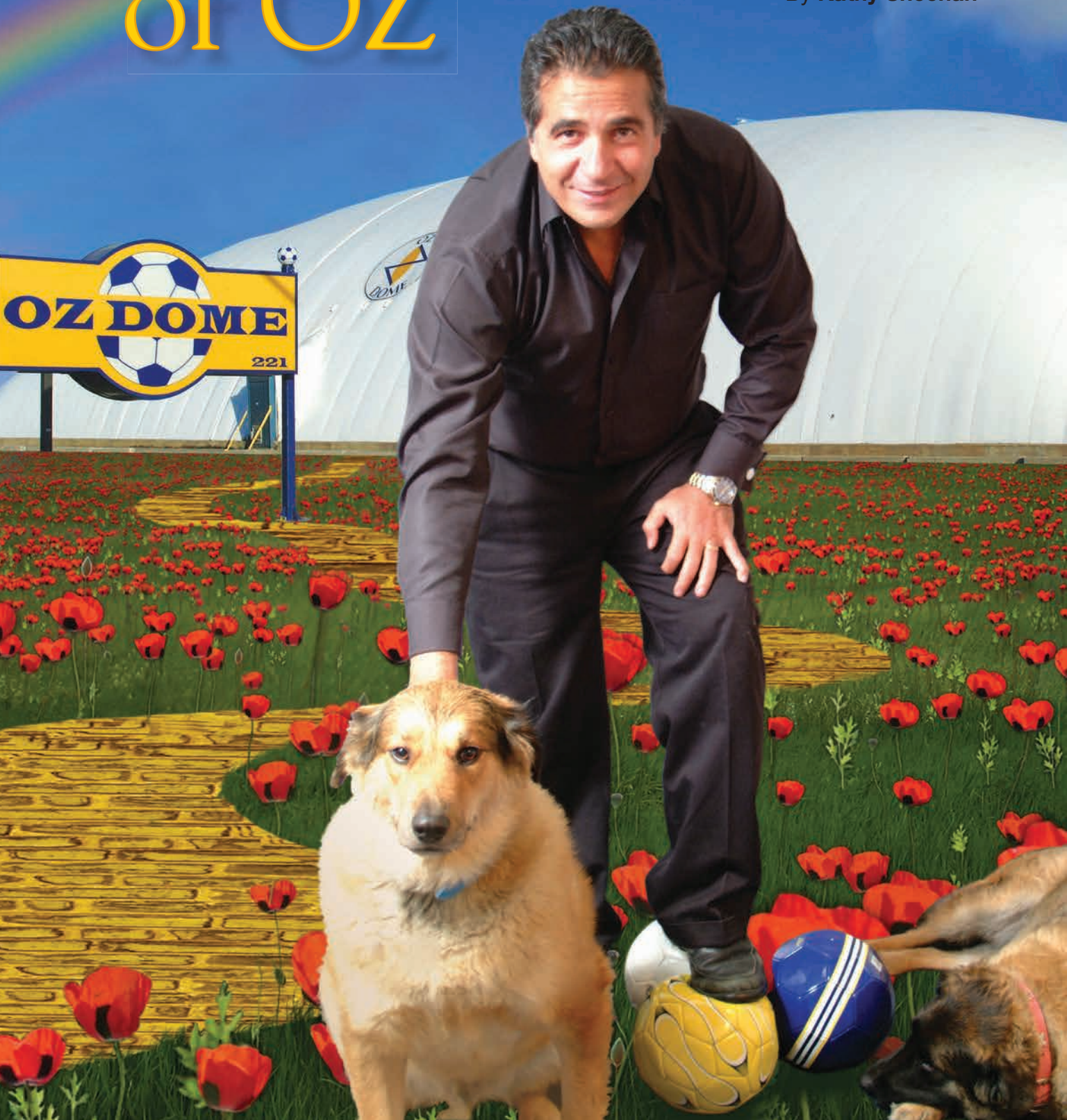
Wizard of OZ

Determination to prove the naysayers wrong and the courage to take risks have paid off for Ömür Sezerman of OZ Optics.

By **Kathy Sheehan**



The things a starving grad student is forced to do! For Ömür Sezerman, a budget that was insufficient for his PhD work drove him to invent an inexpensive coupling device for fiber optic systems, one that would launch him on an entrepreneurial journey and a successful business that continues to grow today.

"Necessity is the mother of invention," Sezerman, founder and CEO of OZ Optics Ltd. in Ottawa (Canada), says, recalling his predicament at Dalhousie University in Halifax, Nova Scotia, in 1982. Part of Sezerman's PhD work involved solving the problem of how to couple light into a fiber from a laser source or from fiber to fiber. His professor had secured $2,500 in funding for the work, but the first of several pieces of equipment Sezerman wanted to buy was a positioner priced at about $2,000.

"I was dealing with a very small core fiber, at 4 microns, and I had to couple light from a 633-nanometer source," he says. Spending so much of his budget on one expensive positioner wasn't going to get him far. "I had to come up with a simpler, cheaper solution," he says.

These challenges weighed on him heavily for several weeks, even into the evenings at home after spending long days in the lab. "I was a little bit down," he says.

And then it came to him one night while relaxing at home, playing with his infant daughter: O-rings. He had used O-rings and screws in cryogenic experiments for his master's degree in solid-state physics. In those experiments, simple O-rings were critical to preventing air leakages. In fiber optics, controlling the beam focus and the tilt angle of the optical lens is critical to coupling efficiency. "Everyone was telling me to avoid angle misalignment," Sezerman said, "but I'm the kind of person who asks why.

"Why can't I control the tilt angle with O-rings?" he asked himself. "If I can control the tilt angle, I can also control where the beam is focused." He immediately realized that he might get good efficiency by tilting the fiber and lens together. And the cost of a few screws and an O-ring would be minimal.

After creating a simple O-ring in the university machine shop himself, Sezerman tested his idea. The result was an efficiency of 60% in the 4-micron fiber.

"I realized this could be something, and I applied for a patent," he says.

Indeed, that very simple, very inexpensive alignment technique for a fiber coupling device became the first of many fiber optic components that OZ Optics sells in more than 60 countries today.

OZ Optics—the name is taken from the first letters of his name and his wife, Zahide—is an SPIE corporate member that designs, manufacturers, and markets hundreds of fiber optic components and hand-held test and measurement equipment for the telecommunications, military, medical, educational, and other industries. With manufacturing plants in Ottawa, Turkey, and China and three regional offices in the United States, the Ottawa-based company has won awards for components that can analyze and maintain polarization and for a sensor system for structural health monitoring of bridges, pipelines, and other critical infrastructure.

Sezerman is a former chair of the Canadian Photonics Consortium where he helped his and other companies with global trade issues, and he was named Ontario's Entrepreneur of the Year for 2001 by Ernst & Young.

Sezerman says one reason for his company's success is his persistence—out of necessity—in coming up with simple, inexpensive solutions for fiber optics, a technology he recognizes as the backbone of most other modern technologies.

Don't Listen to Naysayers

Sezerman's entrepreneurial journey has never been easy.

Born into a poor family in Turkey, he attended Bogazici University in Turkey (receiving a bachelor's degree in physics and electronics engineering) and Dalhousie (where he received an MS but never finished his PhD) on scholarship.

In the early days of his 25-year-old company, "My main problem was that I couldn't sell the product in Canada because I was a Canadian inventor living out the American dream," he says, referring to the American philosophy where "a nobody can become a somebody."

"Every time I tried to do this or to raise money, the question was 'How can a foreign student at Dalhousie University come up with these ideas when all of these big companies like Nortel, AT&T couldn't come up with these things?'

"My answer to them was: My solution is simple. And necessity is the mother of invention. They have a lot of money; therefore, they can come up with complicated solutions."

He also tried to sell directly to the telecommunications giant Nortel, but Nortel needed a much greater quantity of components than a grad student in Halifax could produce in his basement.

Fortunately for Sezerman, American customers weren't as fussy about who he was; they only cared if his fiber optic components worked. He became "somebody" by moving his three-year-old company from Halifax to Ottawa in 1988 where he had better access to American customers,

Continued on page 6 ▶

People Behind The Curtain

Ömür Sezerman doesn't just pay lip service to his opinion about the necessity of surrounding yourself with good people and rewarding them well. Employees at his Ontario, Canada, headquarters can play soccer in the indoor OZ Dome along with community members, have the use of a gym, indoor pool and spa, and other sports facilities, and receive a generous compensation package including stock options for a future IPO.

The key people who helped him build the company:

- **Zahide Sezerman, vice president for human resources, helped her husband start the business and took care of things on the home front in the early years.**
- **Gordon Youle, vice president for test equipment, has a master's degree in physics from Dalhousie University where he met Ömür Sezerman. He liked Sezerman's fiber coupling idea so much he invested his life's savings, some $70,000, to start up OZ Optics.**
- **Garland Best, vice president of components, has been with the company since 1991.**

Photo courtesy of Cindy Xin Li

OZ Optics

OZ Optics, which celebrates 25 years in business this year, will be at booth 8016 at BiOS and booth 4501 at SPIE Photonics West, both in San Francisco later this month.

Ömür Sezerman's company is also supporting this year's SPIE Smart Structures/NDE meeting (San Diego, CA, 7-11 March) as an exhibitor and sponsor.

Fiber Idea Earns Kao Nobel Prize

Charles Kao's work on improving light transmission in optical fibers earned him half of the 2009 Nobel Prize in physics.

In a 1966 paper, Kao and George Hockham, a colleague at Standard Telecommunication Labs, suggested that light losses in thin optical fibers could be reduced if the fibers were made of higher purity glass.

While transmission efficiencies of 1% were common at that time, 95% efficiencies are typical in today's ubiquitous, energy-saving, optical cable networks that carry telephone and data communication around the globe.

Kao, who received the 1992 Gold Medal of SPIE, shared the Nobel Prize with CCD developers Willard Boyle and George Smith.

For more on the Nobel winners, see page 12.

◀ Continued from page 5

manufacturing facilities, research institutions, and a larger labor pool from which to draw employees.

Today, he has 250 employees world-wide and yearly sales increases have averaged about 15% over the past five years. By focusing on exports to the legendary land of opportunity, OZ Optics has its biggest customer base, about 45%, in the United States; Canadians make up only 4% of his customers.

Sezerman also struggled with capitalizing his startup in the early 1980s. He spent nine months negotiating with venture capitalists interested in financing his startup, but they wanted more control of the company than Sezerman wanted to give away. So he scraped together $100,000 from friends, mostly other students at Dalhousie and his professors, to start his company.

(Much later, in 2000 before the telecom and dot-com bust, he was able to raise $25 million from institutional investors to expand the company.)

Appeal Patent Rejection

Even the U.S. Patent Office initially turned down his first application for the coupling device, saying it was too simple.

A few months after the patent rejection, Sezerman saw the patent examiner at an optics conference and the two discussed his application on the exhibition floor. Sezerman showed him how his fiber coupling system worked. "If it was too simple, why didn't anyone else think of it?" he says.

The patent examiner agreed to reconsider Sezerman's application, and later issued him a patent for a tilt-adjustable optical fiber connector.

That same kind of resolve also paid off three years ago when Sezerman was a co-applicant for another patent (he has more than 20 to his credit now) and was rejected. He requested a review of that application and flew to Washington, DC, with lawyers, a co-inventor, and a dazzling presentation. "I did convince them also," he says, and the patent for a method of writing waveguides inside optical fibers with femtosecond lasers was eventually approved.

Always Ask Why

Sezerman says he is an unlikely entrepreneur. Although he learned a little about business working for his mother's tutoring company as a teen-ager, Sezerman thought he would eventually become a doctor, perhaps a surgeon since he was good with his hands.

But physics and electrical engineering also interested him because he had a knack for asking "why?" about the world around him and he was good at engineering solutions to scientific problems.

He was two years into his PhD studies at Dalhousie when his professor got funding for a fiber optics project. "As soon as I got in there, I found my field because fiber optics is a combination of physics and electrical engineering," he says.

Sezerman jumped right into fiber optics and quickly devised the fiber coupling device and, with his colleagues at Dalhousie, a sensor that could determine the velocity of particles in the coronary artery. Their patented laser Doppler velocimetry technique opened the way for laser surgery on the coronary artery and later became an alternative method for the balloon-type angioplasty commonly used at the time to clear a clogged artery.

So, why not start a company selling these devices, he asked himself. Sezerman knew that one big disadvantage would be that it would take years for the sensor to get FDA approval and reach the medical market. "I didn't have the patience to wait 30 years to make money," he says. Besides, somebody else might soon get the same idea and introduce the product into the marketplace before he did.

Why does it have to take so long to get FDA approvals? That was more of a rhetorical question, but he pondered that while other "why?" questions continued to bubble up. Finally, he asked himself: Why not use the alignment technique for the coupling device on applications other than medical?

"And then I got the idea that we could use this thing for making numerous devices," Sezerman says. His fiber optics coupling device could be used in countless products and processes and in many industries. With so many markets for the coupler, from telecommunications equipment to military devices, water treatment to food testing, and for oil and gas monitoring, "I would be recession proof," he says.

It was 1985.

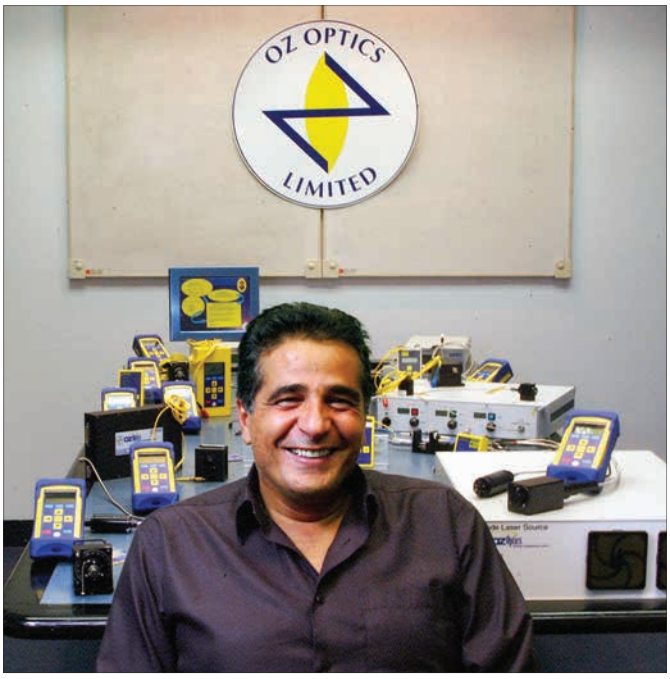
"I realized this was my opportunity to start up a company. There were a lot of things I could do with this device," he says.

Diversify and Win

Sezerman says diversifying his product lines right from the beginning is another factor contributing to OZ Optics' healthy business portfolio, although it turned out to be a disadvantage when he tried to take his business public in 2000. (He withdrew his plans to get listed on the NASDAQ Stock Exchange when the 9/11 terrorist attacks on America followed the tanking of the telecom and other high-tech markets and the contested U.S.

presidential election of 2000 gave consumers jitters. He also disagreed with underwriters who advised him to focus OZ Optics' business on just one market—telecom—instead of multiple markets.)

OZ Optics' fortunes have never been tied to any one sector or region. More than 10,000 customers in some 60 countries buy OZ Optics' products. Some years, polarization-maintaining components (PMCs), hermetic feedthroughs for optoelectronic packaging, and other components for the telecommunications market fly off the shelves. And in other years, visual fault locators, high-power isolators, and sensors, especially distributed strain and temperature sensors or systems (DSTS) for defense, security, aerospace, oil and gas, and construction businesses have kept OZ Optics continuously profitable.



Ömür Sezerman with OZ Optics products.

Sezerman says that sales of fiber optic equipment in the telecom market grew from less than 10% of total sales for OZ Optics in the 1980s to 80% to 85% in the 1990s when that industry saw tremendous growth. Now, total sales in telecom amount to about 30% of his business.

Since fiber optics drives so many high-tech advancements such as laser surgery, laser marking, and a plethora of Internet businesses, many of his products can be used in multiple markets. OZ Optics' Foresight system is one such versatile offering. A year ago, OZ Optics received a Frost & Sullivan award for the development and commercialization of this structural health monitoring system. The DSTS uses Brillouin scattering in optical fibers to simultaneously measure temperature and strain in bridges, dams, pipelines, power and telecommunications lines, oil wells, and other structures where failure could be disastrous.

Real-time, continuous monitoring of structural health allows problems to be corrected before failure occurs and is accomplished by embedding a standard, low-cost optical fiber inside the structure where it can detect unusual temperatures, leaks, corrosion, cracks, and power outages.

The Foresight "smart structure" system is compatible with another system, Optical Network Safeguard known as OZ-Guard, which sends automated reports from remote locations wirelessly via cell phone, e-mail, IM, SMS, or text, giving fault time and location with GPS coordinates.

OZ Optics has also done well in a varied number of industrial markets with its PMCs, collimators, and test equipment, all using simple, inexpensive techniques to control and measure beam angles. It was the first company in the world to commercialize PMCs in 1985.

"What made us survive was the diversity of our customers and the diversity of products in different markets," he says.

Pay No Attention to Wizards

Although Sezerman acknowledges that a good education in physics and engineering and the ability to innovate is important for any optics entrepreneur, he maintains that entrepreneurs are not wizards.

"I'm above average but not a genius," he says.

Successful business owners "are in the right place at the right time," he says, and they have "the guts" to exploit opportunities.

And most important of all, they surround themselves with good people who can make the business grow and flourish.

"The product is secondary," Sezerman says. "It doesn't even come close to the importance of the people who run the company." A business can't be successful if it remains small, he says.

"What makes everything grow is the people," he says, particularly those working in marketing the products. "Without the people, you will have a lot of product that is going to collect a lot of dust." ■

–Kathy Sheehan is managing editor of SPIE Professional.

Mysteries Of Valuation

Turning down offers for good-paying jobs and abandoning his PhD studies, Ömür Sezerman took a huge risk in starting his fiber optics company in 1985. So it was quite ironic 15 years later when he prepared to take his highly profitable Canadian business public and underwriters told him that a history of success would work against him.

"They said it means nothing," Sezerman says. "They don't look at whether you made money. They are looking at how fast you are going to grow, how your sales are down the road."

Their added advice to focus his products solely on the telecom market instead of diversifying was equally mystifying. He concluded that "common sense doesn't exist."

While economic and political factors in the United States were additional pressures to abandon plans to be listed on the NASDAQ in 2000, Sezerman says he will likely make another bid to issue stock in OZ Optics sometime in the future.

For more on how the finance world puts a value on technology companies, see page 8.