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## Forming alliances moves laser optic company forward

By Becky Hurley | June 27, 2003

The entrepreneurial world is full of surprises. Take Directed Energy Solutions, for example. No glossy sign adorns its entry; its offices and adjacent prototype development center are low-key – almost clinical in design.

Yet this under-the-radar Pikes Peak region firm has won numerous government contracts, submits regularly on scientific grant proposals, and currently funds its own operation through a combination of a \$1 million venture capital infusion in 2001 and through successful commercial partnerships and government grant funding. So far, the company, founded in 1998, has also earned its first two multi-year government contracts under the Small Business Innovative Research (SBIR) program.

The DES 14-member team works on potentially life-altering laser optic technologies to benefit the military, government and the private sector. The four-year-old company is headed by former U.S. Air Force Academy professor David Neumann and guided by vice president of business operations Larry Vliet.

Vliet holds an advanced degree in economics. The two execs met while cadets at the USAFA. Over the years, the two men discovered they bring very different skill sets – both valuable to the start-up.

"During twenty years with the Air Force, my expertise was honed in laser technology," Neumann recalls, "so today I understand the challenges the military faces. From remote sensing capabilities to enhanced optical communications, chemical and biological defense and directed energy, we find solutions to military and commercial challenges."

Directed energy refers to laser light and its many applications. "Ideally, through the technology we are developing, tanks or soldiers could be equipped to destroy the enemy's shoulder-mounted weapons and chemical agents. Just think of how useful laser optics could be to our people on the battlefield in Iraq today," he adds.

In addition to work on a device which will power DoD directed energy weapons, DES is also exploring another optic laser application, which is being tested to prove its effectiveness against anthrax, mustard gas and other biological agents.

This revolutionary technology is slated to be used in remote sensing equipment where it enables the military user to generate and manipulate light for use on the battlefield to sweep for biological or chemical weapons. In an entirely different arena, the same laser energy, when directed specifically at oxygen molecules, could be used commercially to eradicate chemical pollutants or toxins from the air.

As this exciting new area of DES research unfolds with its commercial potential, Neumann admits that getting his air-sterilizing product to market will require the infusion of another \$500,000 to \$1 million in venture capital. "Right now we've already got a functioning unit built here in our lab that

could be added to a typical furnace or used to recycle air in an airplane. It is not expensive to produce and has worldwide market potential.

"Look at the SARS threat in Asia – or at the recycled air in domestic airliners," he continues. "Imagine the ability, through optic laser technology, to eliminate bacteria and viruses from the air we breathe. By using advanced laser light technology, we can bombard oxygen molecules with light, exciting its electrons, which in turn collide with and destroy other biological agents."

One additional area that Neumann has identified is adaptive optics in which laser technology is used to improve the capability of earth-based high-powered telescope lenses for astronomy. The cost of sending a Hubble telescope into space is extremely high; through research, DES offers an earth-based laser technology to create artificial "stars". These newly-created laser platforms can then be used to monitor and correct telescope images for atmospheric conditions and other scientific studies.

In its core business, DES is also currently working on a project funded by Raytheon to use directed energy to create special optics for use in anti-missile defense. The program involves creation of an optical component that, when applied to the end of a tubular-shaped weapon, would combat the enemy's field missile capability, using lasers to locate the attacker's location.

Interestingly, most of the company's customers are not based in the Pikes Peak region. "We make many trips each year to Washington, D.C., and Virginia to meet with officials at the National Reconnaissance Office, the Naval Surface Warfare Center, the Defense Advanced Research Project Agency, the military's Joint Technology Office and other government departments." One of its most recent contracts was awarded by the National Science Foundation (NSF).

"By the end of 2002," says Neumann, "our business will have grown by eight times over our first year revenues." Two million dollars of that came through two SBIR grants won in 2002, according to Jay Brasseur, director of technology for the company.

Directed Energy Solutions' offices seem quiet, but that's because the company's advanced development and executive team office separately from another component of the scientific and technology staff.

The latter, dedicated to testing and research funded by a special Cooperative Research And Development Agreement grant, works in collaboration with the United States Air Force Academy's \$5 million fully-equipped laser optic laboratories. Lt. Colonel Rob Fredell, USAFA's director of research, and Dr. Randy Knize, director of the Laser Optics Research Center head the team that collaborates with DES.

"The agreement with DES is one of the first joint programs that the Air Force Academy has formalized with a private-sector company," says Knize. "The government requires that 1 to 2 percent of any research agency's budget be allocated to private industry investment. David Neumann and DES approached us about teaming for an SBIR grant, which could be a win-win for all involved. Our cadets need real world experience. Some of them will be involved with contracting and big business down the road. In addition, we can bring some very bright and talented researchers to their team."

Knize also acknowledges the value of the spin-offs of core research with possible biological or medical applications. "DES may be able to develop a product that gets to the commercial market fairly soon," he adds.

Fredell, who represents the USAFA dean of faculty, serves as an administrator involved in contracting and compliance, says the joint project with DES for the SBIR grant is one of a growing number of research projects in which the Air Force Academy participates.

"We see our involvement not only as important for the development of defense-related research, but as a way to share our resources with companies and universities working on leading edge technology," he says.

"DES is very fortunate," Neumann acknowledges, "to have qualified on a joint optical device technologies proposal with the Academy. Not only do we share expert team members, but our researchers have access to dozens of optic tables, pulsed laser systems and extensive electronics and optical measurement equipment. Most companies of our size just couldn't afford to operate a research lab of this sophisticated level."

Now in its fourth year, Directed Energy Solutions has already achieved an over 80 percent win rate

on submitted proposals. It's customer list includes some enviable names: the Missile Defense Agency, the Army Space and Missile Defense Command, the Air Force Research Laboratory, the Air Force Office of Scientific Research, and the European Southern Observatory – just to name a few.

As far as the future, Neumann, Vliet and company are scouring the investor landscape for funding to allow them to expand their products and services into new commercial areas.

"We see teaming with other private companies much larger than Directed Energy Solutions as a real strategy," Neumann concludes. "If we can serve as an outsourced research and development team for other contractors, we will save the cost of operating expensive internal R&D programs – and we can also offer excellent relationships with our government partners. Now all we need is the funding to grow."

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