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INSIDE



Wine market niche

Within the last 15 years, wine imports from Argentina to the U.S. have been rising. Local entrepreneur David Bullington hopes to take advantage of that trend with his company Andes Importers, Inc. Kroger wine steward Teresa Hardy (above) stocks some of Bullington's wines.

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Clean coal?

Is "clean coal" on your Christmas wish list? It might be on its way—if not this year, then perhaps in the near future.

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—2008— Business of the Year

Luna Innovations, Inc.

Its penchant for groundbreaking research and development, successes in commercial development and commitment to the community easily elevates Luna Innovations to the Blue Ridge Business Journal's Business of the Year.

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Kent A. Murphy, Ph.D. is the Founder, Chairman and Chief Executive Officer of Luna Innovations Incorporated



2008 BUSINESS OF THE YEAR



By Mark Ching

Luna Innovations has a lot on its plate. Researchers there are developing sensors that help surgeons navigate through a patient's body. They're also perfecting antiballistic coatings to strengthen everything from ship decks to helmet visors. Luna also has groups working on enhancing photovoltaic cells and nanomedicines that diagnose and treat diseases on a molecular level.

And if that isn't enough, scientists there are exploring a revolutionary new hair growth product.

"That came about by accident," explained Scott Meller, Luna Innovations' president of technology development. "Groundbreaking innovation almost always happens by accident."

Luna's rapid growth and diverse offerings are no accident, however. Currently, Luna employs 218 people in Roanoke, Blacksburg, Danville, Charlottesville and Hampton, and sells to 30 countries around the globe. Its penchant for groundbreaking research and development, successes in commercial development and commitment to the community easily elevates Luna Innovations to the Blue Ridge Business Journal's Business of the Year.

From floor cleaner to fiber optics

The founding of Luna Innovations is legendary. Kent Murphy worked as a janitor at ITT Electro-Optical Products Division, a precursor to ITT Night Vision. Researchers there noticed his interest in science and technology and took Murphy under their wing and encouraged him to pursue a college education. As a graduate student at Virginia Tech, Murphy invented a gauge that measured stress in aircraft designs. That led

to a contract with Northrop Grumman, and soon Murphy was doing business with Lockheed-Martin, Boeing and the U.S. Air Force.

Needing more space, the now-seven person outfit moved into a barn in an orchard owned by Virginia Tech. The company incorporated in 1990 and went public in 2006.

Even the company's name owes its existence to happenstance. Originally, the company went by the workmanlike name F&S Technologies (standing for fiber and sensor). Murphy liked the name Luna because he had read that luna moths have highly developed antennae that can detect pheromones over great distances — a good symbol for a sensor-making company. But Luna was only one of the names on the table. The way Meller tells it, they came out of a meeting discussing the name change to find a luna moth perched on the door. "If that wasn't a sign," he said, "I don't know what is."

Innovation nation

Of course, the other half of the name is "Innovation." Luna takes it seriously. There are no "employees" or "associates" at Luna. Everyone is an "innovator." Their list of products and projects is as diverse as it is reminiscent of science fiction. Their shape-sensing technology allows an operator to determine the shape and position of a length of optical fiber in real time even as it bends and changes.

Meller explained how the idea behind shape sensing came out of tragedy: "After 9/11, robots were finding survivors under the rubble, but rescuers couldn't find them because they didn't know where the robots were. The government really wished for a

way to track the position of a robot in real-time 3D that was immune to interference."

The GPS and RF signals the robots were sending out couldn't penetrate the rubble, but a shape-sensing tether not much thicker than a human hair could have given rescuers an exact fix on the robot's position. Now a surgeon can use shape sensing to see how a catheter moves through a patient in 3D. The technology also has applications in virtual reality and underwater detection, which the government wants to use to sense threats to naval vessels.

Luna Innovations is also developing materials with a wide range of uses. The Pentagon is interested in antiballistic polymers that absorb blasts. Coating helmet visors, ammunition magazines and even vehicles with the polymer greatly improves safety and saves lives. Luna is also working on composites that do everything from resist corrosion and electromagnetic interference to materials that heal themselves.

One of the newest areas of research is in nanotechnology. Luna Innovations has set up a division called Luna Nanoworks to pursue research and development in this growing arena. (Luna has spun off several of its original divisions. Luna Energy, created in 2002, was acquired by Baker-Hughes in 2004. Luna iMonitoring, which made wireless sensors, is now part of Ferguson Beauregard.)

While much of the Nanoworks effort is directed at "nanomedicine," or diagnostics and therapeutics on the molecular level, Luna's nanotechnology breakthroughs figure into such divergent applications as improving solar cells and restoring hair growth, said Brian Soller, president of the products division. In fact, the hair growth research was another accidental innovation.



Left: Senior research scientist Shi-Hau Own (left) and research associate Thomas Amos in Luna's Advanced Materials Group develop test strips for evaluating Luna's impact indicator coating.
Below: Eric Sandbord, Research Engineer, works on Luna's shape sensing instrument.

"That came out of research into wound healing," Soller recounts. "We tested on mice with shaved areas and noticed how quickly hair grew back there."

Soller agrees with Meller that some of the best breakthroughs happen through seized opportunities. "We try to guide what we research according to commercial needs," he said, "but the real groundbreaking innovation often comes by accident along the way. You can't just think your way there."

"Luna is not a company that fits into a regular mold," said Murphy, who is also chairman and CEO. "Our main product is not a box or a thing. Our main product is innovation. It is at our core and it is in our name. Our intellectual capital is our primary asset."

That intellectual capital is coupled with a disciplined business model. "The funding often determines where we go next," explained Meller. The company looks for fields of research that government and other groups are funding, and also needs in the market. "Once the money is there, then we can figure out how to innovate [in those areas]." Following the market not only allows for Luna's intellectual and developmental diversification; it's also reflected on the balance sheet. 2008's third quarter numbers show 21 percent growth over 2007's third quarter and quarterly revenue of more than \$10 million for the first time in the company's history. The company is still showing a net loss, but that, too, is improving — about \$500,000 in the third quarter of 2008 versus \$1.8 million for the same period in 2007.



Photos: Mark Ching

"We don't just innovate on our own"

One of the ways Luna hopes to grow is by increasing its partnerships. The company has received a grant from the National Cancer Institute for research into improving MRIs. It is also building a partnership with Intuitive Surgical, the Silicon Valley company that makes the da Vinci Surgical System. Carilion recently acquired a da Vinci, and the health care giant is also a partner with Luna.

In 2005, Carilion and Luna teamed up to establish a regional biomedical cluster, and in 2006, Luna moved its headquarters to the new Riverside Corporate Center across from Carilion Roanoke Memorial Hospital (the research, development and manufacturing

arms remain at the Blacksburg location). Carilion doctors also help with testing and trials. Sharing the intellect of the region is a great asset, according to Meller: "We don't just innovate on our own. We recognize innovations outside Luna."

The wealth of brainpower in western Virginia is one of the stated reasons Luna has remained in the area. Not only does the company feel a commitment to its birth region; there are many advantages, as well.

"There's been a shift in the last few years across the tech sectors away from the big cities because of cost, attractiveness to talent and connections to universities and centers of research and development," observed Soller. "The only hurdle is that when people



Mark Ching

Scott Patrick (left) Manufacturing Engineering Technician, & Loey French, Optical Research Engineer, develop a sensor system for a federal program.

Luna

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think high tech, they don't think of us first. They think Boston, New York and the Bay Area. But once they come here, they're immediately attracted to it."

Soller is a Wisconsin native who studied optical physics at the University of Rochester in New York. His assessment of the New River Valley echoes that of Meller, who came from Virginia Beach and studied at Virginia Tech: "To be in a small university town and work for a cutting-edge company—you can't get better than that."

Virginia Tech and the tenants of its research park, while major resources, are not the only ones in the region. A Roanoke company oversees the manufacture of electronic boards in Luna's monitoring equipment. And when it was time to open a dedicated

nanotechnology manufacturing facility, the company chose Danville to be the home of Luna Nanoworks.

"Danville fell on hard times after the textile industry left," Meller explained, "but we saw big potential there in the workforce. It's still manufacturing, but it's next-generation." Luna Nanoworks resides in a renovated warehouse on Tobacco Row and Meller boasts that Luna's presence has been an anchor to bring other businesses to the struggling region.

Luna is an annual sponsor of the NewVa Corridor Technology Council (NCTC), a group that promotes technology and industry in the NewVa Corridor, which stretches across 12 counties from Alleghany in the north to Smyth in the south. "The people at Luna—I get the impression they're very committed to the region," said Cory Donovan, NCTC's executive director. "Kent [Murphy, who also sits on NCTC's Board of Directors] has a great commitment to staying and growing the area. I would be shocked to see them do anything detrimental to the region."

The future for a futuristic company

What's on the horizon for a company that aims to define future technology? Carilion doctors are testing an ultrasound system that detects emboli, or air bubbles in the blood. Luna researchers are mining nanotechnologies for products that measure and remediate pollution and other environmental concerns. In addition to health care and environmental technologies, Luna also has areas devoted to product development and manufacturing, telecommunications and monitoring, which is where the company got its start.

More telling, perhaps, is the emphasis Luna likes to place on a different future — the future of the community through "technology-based economic growth."

"It's a neat, diverse company," Meller says. "Look for great things to come in the future."

(Mark Ching is a freelance writer based in Roanoke.)