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AUBURN COUNCIL COULD VOTE THIS WEEK ON EMINENT DOMAIN B-1

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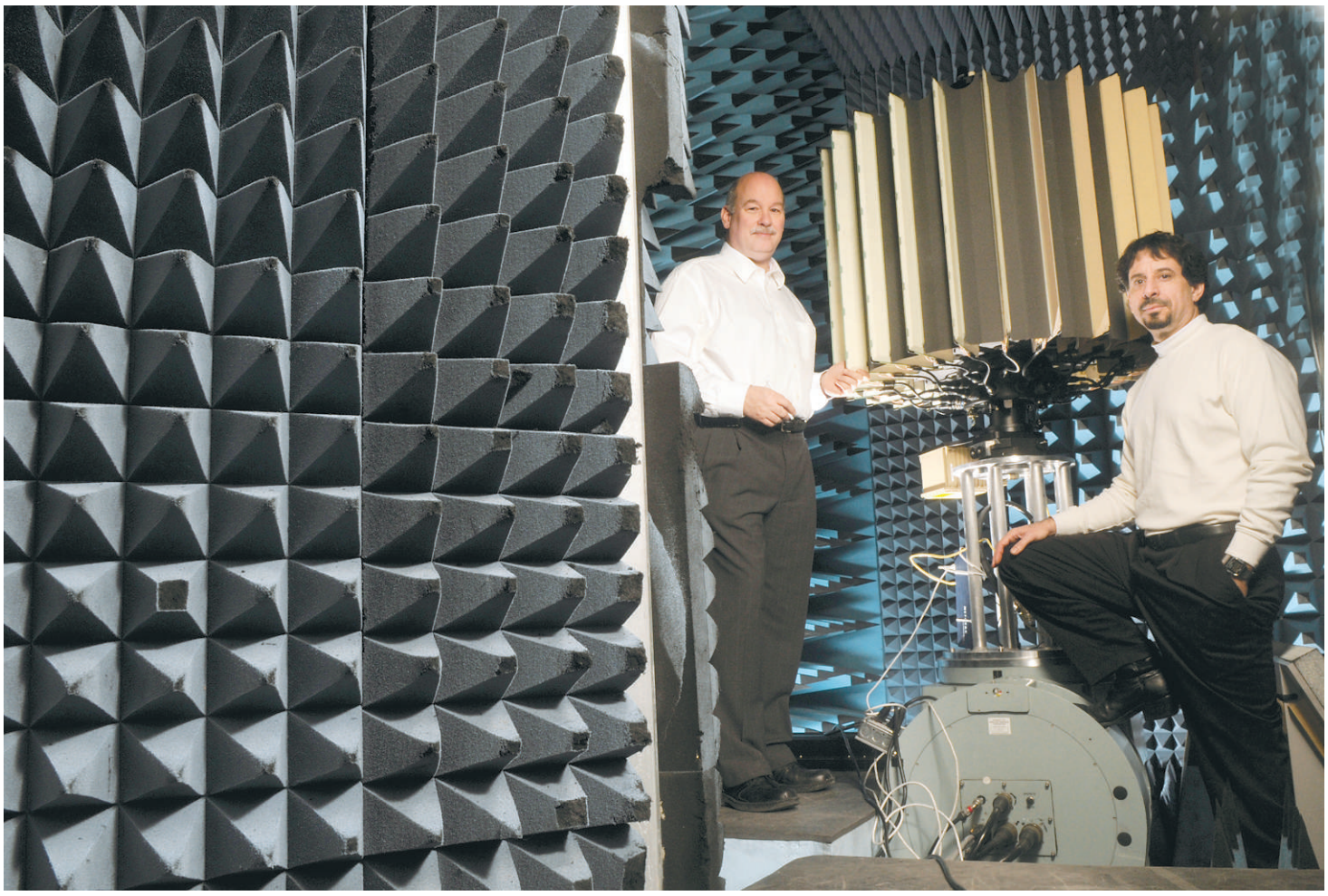
RUSH ORDER FOR INNOVATION SAVES COMBAT LIVES

SYRACUSE COMPANY'S INVENTORS MEET THE ARMY'S CHALLENGE TO CUSTOMIZE ANTI-MORTAR RADAR



"WE'RE A WAR-ON-TERROR factory," says Tom Wilson (*left*), SRC vice president and chief strategy officer. Wilson and Mark Condolora, director of radar programs, stand next to their small, portable radar device, known as the Lightweight Counter Mortar Radar, inside a radar-testing chamber where every surface is covered with energy-absorbing foam spikes.

Frank Ordoñez / The Post-Standard

By Dave Tobin
Staff writer

Mortars are a problem in warfare. Cheap, lightweight and deadly, they can be fired and then easily moved before defenders can strike back.

For decades, the Army tried to see flying mortars using truck-sized radars. Big and unwieldy, they could "see" in only one direction. They missed a lot.

The Army wanted something smaller and better, and sent out a request. The country's big defense companies weren't interested. Too far-fetched.

So the Army asked smaller defense research companies. Only one tried — Syracuse Research Corp.

In a matter of three years, engineers there came up with a lightweight radar that was named an Army top-10 invention of the year.

At nearly the same time, company engineers devised an electronic jammer that disables radio-controlled roadside bombs. The two inventions have saved countless lives in Iraq and Afghanistan, and their sales have transformed the company.

The confluence of the company's know-how and global turmoil have turned what for decades was a little-known, wonkish, nonprofit organization into a defense contractor that is possibly Central New York's fastest-growing business.

Since 2001, employment at the company, which now goes by SRC Inc., has soared from 425 to 1,050. During that period, sales exceeded $2.3 billion — most from these two devices.

In a time when manufacturers are leaving New York and the United States, SRC spun off a for-profit business to run a new manufacturing plant.

Every day in a Cicero strip mall, next to offices for Best Buy and the state Department of Motor Vehicles, workers build some of the most advanced military equipment in the world.

IED FIGHTER, TOO

Since SRC's beginnings in the late 1950s, defense research and invention were the company's chief purpose.

SRC invented a new radar every year in the 1980s, specializing in radar that saw incoming artillery. It didn't manufacture them. Its radar prototypes were the defense industry's version of a Detroit concept car — futuristic designs that would one day change the way people did things.

By the late 1990s, SRC was looking to expand into manufacturing.

Along came the Sept. 11, 2001, attacks and the U.S. response. And SRC's intellectual pipeline just happened to have the

SRC'S, PAGE A-8

FROM PAGE ONE

SRC'S INGENUITY DRIVES GROWTH IN JOBS, SALES

SRC'S, FROM PAGE A-1

seeds for two inventions the military desperately needed.

The real game-changer for SRC has been its electronic jammer that disables radio-controlled roadside bombs. It's called the Crew Duke, and SRC has sold more than 25,000. The Army won't let company officials talk about it.

Roadside bombs, or IEDs, have caused at least 70 percent of American combat deaths and injuries in Iraq and Afghanistan. SRC has upgraded its Crew Duke three times. Its second upgrade logged sales of at least $1.2 billion through 2008, according to the U.S. Government Accountability Office.

"We're a 'war on terror' factory," said Tom Wilson, a vice president and chief strategy officer.

HOW SMALL CAN IT BE?

SRC's small, portable radar device, known as the Lightweight Counter Mortar Radar (LCMR), began with a vague request in 1999.

The Army wanted a device that could locate artillery firing positions from any direction, and that soldiers could easily move. It didn't have to be radar. But radar was what SRC engineers Steve Bruce and Tom Wilson knew.

Over months, without any Army commitment, they developed a concept for a radar that electronically saw in all directions and mounted on a Humvee.

It was a first of its kind.

Existing artillery radar used big panels and weighed tons. Its field of vision was roughly 90 degrees. Enemy forces could easily hide.

To see everything, a big radar panel could mechanically rotate, in theory. Bruce and Wilson didn't think that would work for a lightweight version. To spin fast enough would take a motor that would be heavy and prone to breakdowns.

They imagined a device with 24 antennae in a circle, like spokes off a hub. It was much smaller than any existing radar — but still too big, the Army said.

Here's why:

The Army's 75th Ranger Regiment, part of the Special Operations Forces, wanted the device to be portable. The elite airborne unit can't haul big radar to the remote places it goes. To track mortars, Rangers still relied on a technique as old as the Civil War. They analyzed the craters.

Rangers wanted something that two paratroopers could carry on their backs when they jumped out of an airplane. It had to assemble without tools, like a portable barbecue grill. That meant it had to break into two packs of 60 pounds — a paratrooper's limit.

This was fantasy. Artillery-detecting radar was big and required lots of power. It was highly calibrated. It needed to be regularly tweaked and adjusted, usually in a factory.

Rangers were asking for something roughly 1/100th of the size, weight and power needs of existing artillery radar. Something that would run off batteries. Combat soldiers, not radar engineers, would assemble the unit. With precision. While being shot at. Without tools. In the desert. Mountains. Wherever.

GEEKS ON A MISSION

The challenge hooked Bruce and Wilson.

"I've always been kind of obsessed with problem solving," Bruce said. "Once I get into these things, I think about it on the drive home, on the drive to work, in the shower, when I wake up at night."

As a teenager in a small northern Michigan town on Lake Huron, all Bruce wanted to do was work on cars. Until he spent a year doing little else. Good at math, he earned an electrical engineering degree, which became his ticket to General Electric in Syracuse. He obtained a master's degree in computer engineering at Syracuse University and was hired in the mid-1980s by SRC, where he headed up its radar program.

Wilson was an Army radar technician before attending SUNY Buffalo for electrical engineering and Syracuse University for computer engineering. Like Bruce, he started at General Electric, and when Bruce left for SRC, he convinced Wilson to join him.

Where Bruce talks in a leisurely, analytic way, Wilson is prone to accelerating bursts of description, breaking into laughter and flashing mischief.

Once, for an SRC picnic, he organized a geek's egg toss. Participants designed and built a trebuchet, a sophisticated catapult, which they used to hurl eggs at targets.

The two engineers' offices were next to each other. They met daily to brainstorm ways to shrink and lighten the device. Wilson typically was the one at the whiteboard, scribbling ideas. Bruce worked algorithms on his computer. They consulted SRC specialists in software development, antenna technology and digital signal processors.

Based on their antenna calculations, the device would have to be about 3 feet across and 3 feet high — half the size of an oil drum. It was ridiculously big for a soldier's back, but the best they could do.

At that size, how would they make it light enough? How would it assemble? Come apart? Should it collapse like an umbrella? Could it fit in two suitcases?

This was unfamiliar territory. SRC engineers were the idea people. They didn't design consumer products.

For that, they called an inventor in Auburn.

JUST BUILD ONE

J.B. Allred ran a nine-employee business out of the old Auburn Savings Bank building in downtown Auburn. Offices on the top floor, a shop in the basement.

He had moved from California to work at Welch Allyn, and he had a slew of patents to his name. Among them, an ultrasound instrument that dissolved and removed cataracts, and a tiny scope that sees inside organs and tissue.

"I've done about 40 bowel surgeries on pigs," he said recently. "I swear, if it was war, I could fix you."

In August 2000, Allred sketched three versions of Bruce and Wilson's radar concept that either disassembled or collapsed. The engineers chose the sketch with pieces that fit together, something like Legos. For the next six months, they worked up a computer graphic design that the Army liked.

They still hadn't built anything.

Now SRC had to construct a prototype — one small, portable radar unit it could test. For that, it received $1 million from the Army.

"That might seem like a lot," said Mark Condolora, SRC's director of radar programs. "But in our business, that just pays the salaries of a few guys for a year and a half."

To start the process, Wilson enlisted his 8-year-old son, Alex.

One weekend, father and son took glue gun to cardboard. On their dining room floor, they built a full-scale model. It couldn't see mortars, but people could touch it.

A TEST FLIGHT

The prototype looked like a thick automotive air filter on a tripod. Wilson and Bruce had tested it in a special foam-lined room at SRC. They needed to try it in the real world. Could it see airplanes?

On a late summer day in 2001, with special permission from the control tower, Allred flew patterns over Hancock Airport. Condolora, newly hired from Lockheed to head the small radar's production, joined Allred in the cockpit, a GPS unit in his lap. Wilson and Bruce tracked Allred with the radar unit from SRC's roof — an engineer's version of "Can you see me now?"

The tests were a success. But could it see live mortars?

They took it to the Aberdeen Proving Ground in Maryland. The prototype was still in science project stage. Antenna assembly here, digital signal processor over there, all wired to a laptop inside a rented van.

The thing recognized mortars almost instantly. Not only could it locate firing locations from any direction, it detected fired mortars so fast that soldiers could have moments to protect themselves and maybe even shoot the mortars out of the sky.

Developing radar prototypes usually takes years. It had been 13 months since Bruce and Wilson's team started working on the $1 million prototype contract.

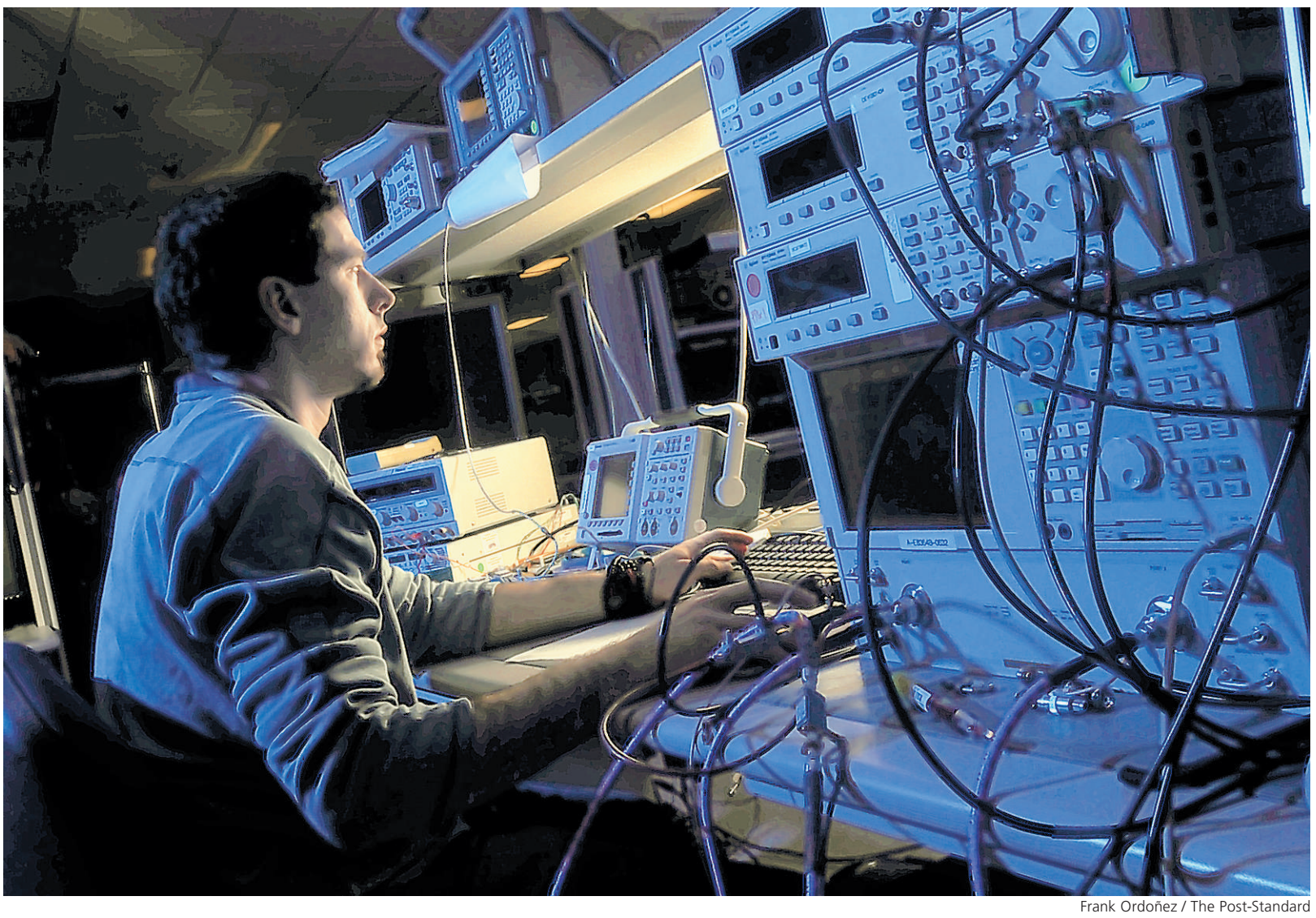
One month later on Sept. 11, 2001, the United States was attacked.

THE HOUSE THAT DEFENSE BUILT

Since its own wartime surge, SRC has built a new headquarters — a two-story, 120,000-square-foot energy-efficient structure with big, triple-pane windows in a Cicero business park.

Carbon dioxide sensors trigger fresh air to ward off grogginess. LCD monitors in the reception area post job listings. "Collaboration spaces" around the building are arranged like sections of a hotel lobby, with couches and easy chairs. Dress is business casual.

"They are very, very bright,"



Frank Ordoñez / The Post-Standard

MICHAEL TRACHSLER works inside the SRC lab where the company makes small portable radars.

U.S. Army, August 2009

U.S. ARMY Pvt. 1st Class Alysha Gleason (*left*) and Sgt. Chad Ervin, both members of Counter Rocket, Artillery and Mortar Team, from Echo Battery, 4th Battalion, 5th Air Defense Artillery Brigade, conduct maintenance on a radar station at Forward Operating Base Delta, in southern Iraq, last summer.

Allred said. "You want to be well rested when you go there. Everybody was focused on making the thing work. When people disagreed, it was technical. And they would sit there and work through the technical issues until they came up with the best solution."

Receptionists check that visitors are U.S. citizens. Signs prohibit cameras and tape recorders.

The building opened just three years ago. Bob Roberts, SRC's president and CEO, expects the company will outgrow it in another year.

'THEY PUSH THE TECHNOLOGY'

The LCMR's design evolved: Paratroopers don't carry them. The radars are airdropped in two 60-pound boxes.

While developing the radar, Bruce and Wilson used antenna, software and algorithms SRC had developed over the years — some that had not had a practical use. Until now.

They used cell phone parts, which were cheap, small and light. Still, the prototype, with an aluminum housing, wasn't light enough for paratroopers.

Allred suggested they use carbon fiber, which he could fabricate. Carbon fiber was a relatively new material, twice as strong as steel, half the weight of aluminum, but four times as expensive. There was no other way. And the need was urgent.

The U.S. had invaded Afghanistan. Mortars were killing soldiers. Rangers wanted 24 small radar units — fast. They were ready to give SRC a $25 million contract, and they wanted the order in six months. SRC had never produced that many of one thing.

In San Diego, Bruce approached Todd Thornton, an ex-Marine electrical engineer and owner of a four-employee company that made power amplifiers. They'd never met, but Bruce had read an article about Thornton. He told Thornton what they needed, and Thornton sketched a design on a napkin.

Bruce and Wilson deliberately sought out small companies for component parts. They wanted to collaborate directly with owners.

"A lot of companies won't ask you for input," Thornton said. "SRC asks what you recommend. They want to know how they can help you produce something in thousands of pieces. They're tough, but they're fair. They really push the technology."

Since his first SRC contract, Thornton's company has grown to 150 employees, in large part because of his work with SRC, he said.

Before SRC had an Army contract, it bought $5 million in parts to speed the production cycle, gambling on the success of the radar.

It still had no factory, no assembly line, no economies of scale. It reconfigured its laboratory for production, hand-building radars on workbenches, one by one. Staff worked seven days a week, and began producing about two a month.

"It was a very, very intense period," said Bruce, who has moved on to another defense contractor. "We were at war. And literally, this thing could save lives."

SRC technicians and engineers worked 12-hour days. Allred canceled a nonrefundable, $10,000 cruise for him and his wife. He and his staff began working seven days a week. When his company finished a bunch of pieces, he'd load them in his Mitsubishi Eclipse sports car and drive them to SRC.

"We were a little company, and SRC was trusting us," Allred said.

Allred has since grown his company to 42 employees and moved it to a new building in Elbridge.

By radar standards, 24 units was a big order.

At less than $1 million each, they were one-tenth the cost of previous artillery radar. And versatile. In a way, they were the cheap cell phones of radar.

SRC thought it'd sell 40. It's sold more than 500.

Once the Rangers had them, the rest of the Army wanted them. So did the Marines. Great Britain, Israel, Tunisia and Canada wanted and got them, through U.S. military sales.

"Mortars had been a constant problem. In one town, there was a guy riding around in a pickup truck shooting at us. We never knew from which way it would come. It (SRC's radar) made a difference. We wanted more of these things."

— Retired U.S. Army Col. Lee Flake, of Manlius, on SRC's radars in Iraq

Retired U.S. Army Col. Lee Flake, of Manlius, remembers when the first of SRC's small radars arrived in Iraq.

"Mortars had been a constant problem," Flake said. "In one town, there was a guy riding around in a pickup truck shooting at us. We never knew from which way it would come. It (SRC's radar) made a difference. We wanted more of these things. We all wanted more of them."

PRIVATE TESTING GROUND

Before shipping counterfire radars to a war zone, the Army tests each one. Traditionally, it did that at an Army proving grounds in Yuma, Ariz., 1,000 square miles of barren desert under clear skies.

For each radar, 200 mortars would be fired from different directions, angles and speeds.

SRC's lightweight radar presented a new problem for the Army. Yuma was running out of ammunition. One soldier blew off part of his hand firing a test mortar. SRC's radars bound for Iraq and Afghanistan bottlenecked in Arizona.

So SRC engineers pitched the Army another idea. In Cicero, SRC has a special chamber to test radar. Why couldn't the Army build its own, a big live-fire simulator chamber, closer to Syracuse?

SRC helped Army engineers design a $3.3 million chamber at Tobyhanna Army Depot in northeast Pennsylvania. The room is nearly the size of a tennis court, 40 feet high. Walls are covered with energy-absorbing foam spikes.

The only thing tested there is SRC's lightweight radar. The Army estimates it saves $25,000 per radar testing them at Tobyhanna.

THE NEXT CHALLENGES

For years SRC had worked to make the radar distinguish birds from artillery shells, so soldiers wouldn't return fire at seagulls.

In January 2009, opportunity was born when a flock of geese collided with a passenger jet over New York City, and the pilot landed in the Hudson River.

It wouldn't be a far leap, the engineers figured, to program their radar to detect the birds. They call the modified radar B-STAR. It is still being tested.

The company also sells a different version of the LCMR to monitor low-altitude, slow aircraft for border patrols, and is marketing a spinoff to track unmanned drones to prevent mid-air collisions. Risk of collisions with manned aircraft has limited the use of unmanned drones in the U.S.

SRC projects the lightweight radar with its variations will sell strongly for 20 years.

The company has other radar products in the works.

It adapted its 360-degree artillery-detecting technology to larger units with longer range and greater accuracy. It is working with Lockheed Martin in Syracuse to build a radar called the EQ-36, at a cost of roughly $12.6 million each. The U.S. Army plans to order more than 180 EQ-36s valued at more than $1.6 billion.

It is rapidly expanding its cyber-security research capabilities. And it's selling another first-of-its-kind radar that penetrates foliage, called the Forester.

SRC's financial success has surprised even its president. When Bob Roberts joined the company in 1991, the company was $1.5 million in debt, he said. Annual sales were $10 million. He hoped that in 15 years sales could reach $50 million. Instead, by 2006 sales were $623 million.

Measured by sales alone, SRC remains a minor player in the defense industry. The Lockheeds and Boeings of the world log annual sales in the tens of billions.

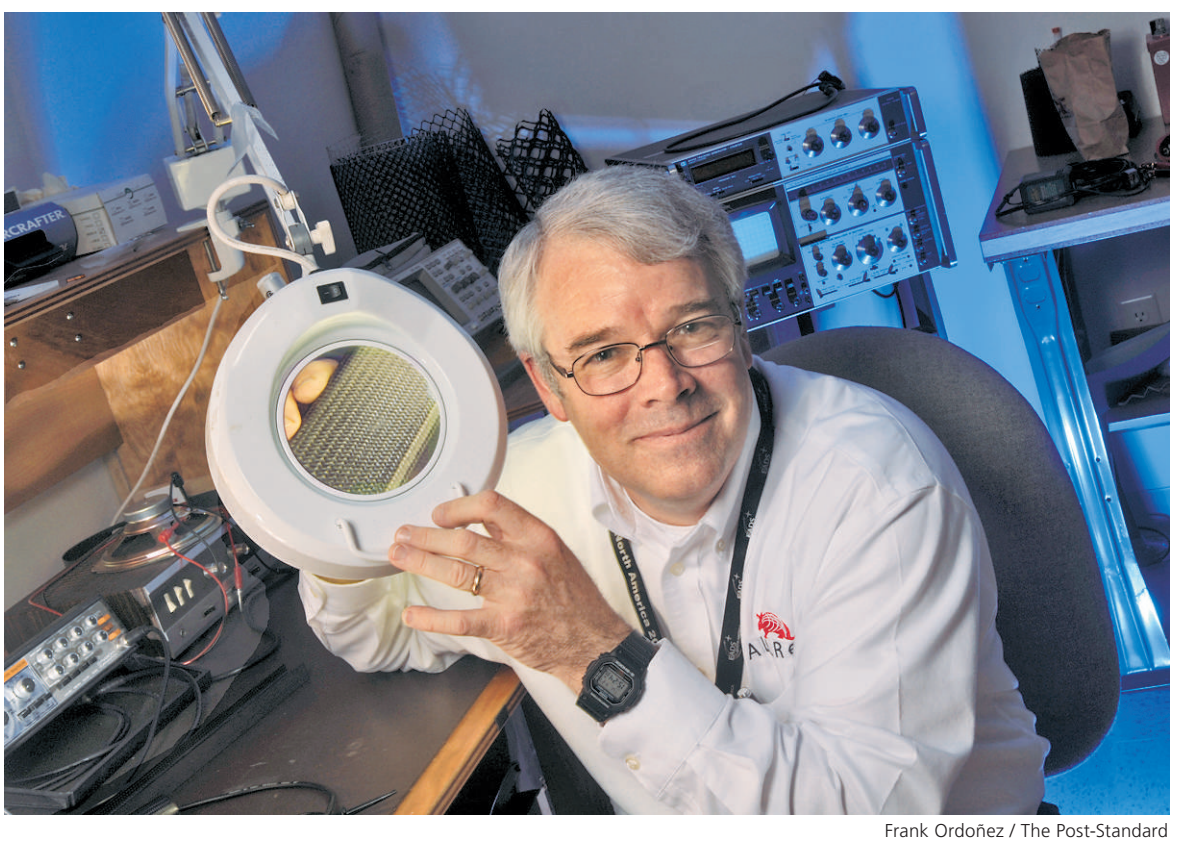
But SRC, the home-grown research company, has begun playing with the big boys. Since registering in 2006, it has spent nearly $1 million lobbying members of Congress.

It's also claiming its stature as a top Central New York employer with long-term prospects. The company's name will be on a new Onondaga Community College arena, tied to a $1 million scholarship fund the company created. SRC donated another $500,000 to Syracuse's "Say Yes to Education" program.

Throughout this recession SRC has posted job listings, dozens at a time: jobs like cyber intelligence specialist, network intrusion analyst and software modeling engineer.

Despite the growth, SRC can stay true to its wonkish origins. At a company dinner in November, SRC honored six of its inventors. Each received a pocket protector. There was work to be done.

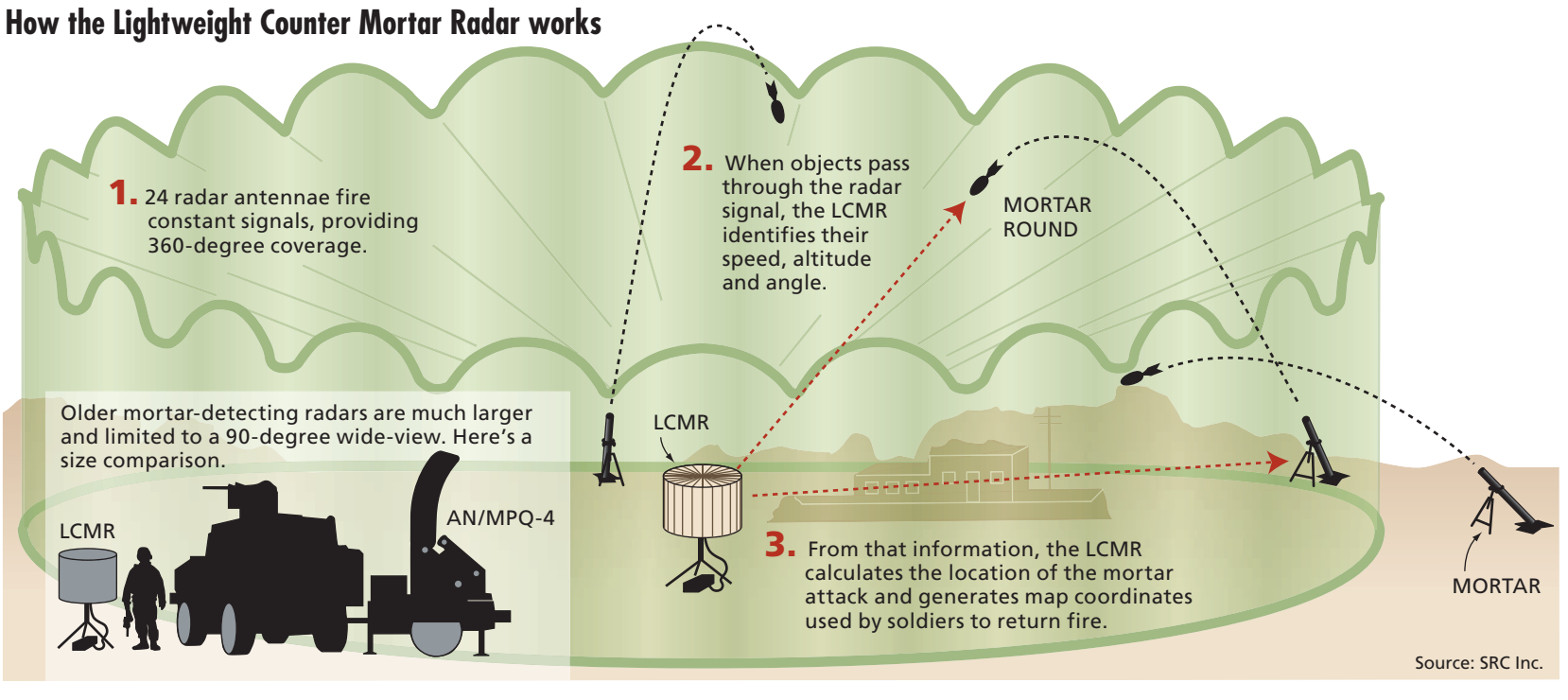
Contact Dave Tobin at dtobin@syracuse.com or 470-3277.



J.B. ALLRED holds a magnifier to show the detail of the carbon fiber his company produces in his Elbridge lab for SRC's anti-mortar radar. SRC came to him to figure out how to make the radar small and light enough for two paratroopers to carry in pieces on their backs and assemble in the field. Allred's carbon fiber is twice as strong as steel and half the weight of aluminum.

Frank Ordoñez / The Post-Standard

How the Lightweight Counter Mortar Radar works



Source: SRC Inc.

ABOUT SRC

HISTORY

1957: Founded as Syracuse University Research Corp. to advance radar and electronic warfare research. Recruited researchers from the University of Illinois and from Carnegie Tech, now Carnegie Mellon University.

1975: Amid Vietnam War protests, SU officials asked the company to stop military work. Ended affiliation with SU. Reorganized as Syracuse Research Corp. Commonly referred to as SRC.

2005: The company formed SRCTec Inc. to manufacture products.

2009: Syracuse Research Corp. officially renamed SRC Inc.

PROFITS

Nonprofit: SRC Inc. is exempt from real estate, sales and most corporate taxes. It reinvests earnings into new facilities, equipment, internal research and development projects, new initiatives and professional training for employees.

Profit: SRCTec is a for-profit company.

SPINOFFS

Former SRC employees have started 17 Central New York companies, which employ about 2,800, SRC says.

EMPLOYEES

1,050 (850 with SRC; 200 with SRCTec), up from 425 in 2001.

TOP SALARIES

Annual compensation (salary and benefits, including deferred compensation) in 2008, according to tax filing of SRC:

Robert U. Roberts, president and CEO, $1,691,095

Paul G. Tremont, executive vice president of operations, $440,345

Pauline C. Fuller, chief financial officer and treasurer, $421,790

James F. Holland, vice president of administration, $366,204

Robert P. Lane Jr., general counsel: $316,083

Thomas A. Wilson, vice president of systems technology, $301,708

(Compensation of Mary Ann Tyszko, president and CEO of the SRCTec for-profit side, is not available.)

WHAT SRC DOES

MAKES THE CREW DUKE, an electronic device that disables roadside bombs and sends electronic data to SRC for analysis.

MAKES THE LIGHTWEIGHT COUNTER MORTAR RADAR, which identifies firing locations of mortars and rockets.

MAKES FORESTER RADAR, which sees through foliage.

INTELLIGENCE: Analyzes data for the Department of Homeland Security on anti-terrorism and counter-narcotics.

ENVIRONMENTAL: Developed searchable databases of toxic substances and helps the U.S. Environmental Protection Agency develop risk assessments for chemical exposure, including emissions from municipal waste incinerators.

CYBERSECURITY: Support to federal agencies.

LOCATIONS

At least 14 offices, including:

SYRACUSE AREA, 735 employees.

ARLINGTON, VA., 14 employees. Works with the EPA evaluating chemicals and their health and environmental risks.

CHANTILLY, VA., 84 employees. Works with the Pentagon and the National Reconnaissance Office, the agency that designs, builds and operates the nation's reconnaissance satellites.

DAYTON, OHIO, 47 employees. Supports information technology contracts with the National Air Intelligence Center, monitoring foreign air and space threats.

FEDERAL POLITICAL CONTRIBUTIONS

$48,650 from SRC directors and employees since 2002. Nearly half, $20,700, went to former U.S. Rep. James Walsh, R-Onondaga. Walsh, who held a powerful position on the House Appropriations Committee and helped secure hundreds of millions of dollars in defense contracts for SRC. He was keynote speaker at SRCTec's grand opening in 2006.