Tech assists with company’s manufacturing processes

Nancy Fullbright  
Research News

Spectral Response, a Duluth-based manufacturer of circuit boards, has a lot going for it. It just celebrated its 21st year in business, 70 percent of its workforce has been employed there between five and 10 years, and it won the 2008 Georgia Manufacturer of the Year Award from the Georgia Department of Economic Development.

But Kevin Melody, president of the company, says Spectral Response had to develop innovative ways of thinking to survive and thrive.

"Like everybody, we faced an onslaught of competition from low-cost manufacturing. We..."  
Assist continued, page 3

Internal Auditing works to shift focus into consultant role

Robert Nesmith  
Communications & Marketing

According to Director of Internal Auditing Phillip Hurd, the relatively few cases of misuse by state purchasing card holders have caused the department to concentrate on only one aspect of its mandate. Through improved technology and training, the newly named director hopes to realign the office with some of its original intent.

In the late 1990s, Hurd—who came to Tech in 1999—says the office was more of an "old-school" auditing department. Bob Thompson, former executive vice president of Administration and Finance, shifted the department’s focus from strict financial auditing to more of a risk-assessment mandate, which included an entirely different set of criteria.

Using sexual harassment in the workplace as an example, Hurd explained that non-budgetary factors can have a direct financial effect on the department or unit. "A hostile environment will drive..."  
Auditing continued, page 3

El-Sayed awarded Medal of Science

Mostafa El-Sayed, Regents’ Professor in the School of Chemistry and Biochemistry, has been awarded the 2007 Medal of Science, the nation’s highest honor in the field.

"My goodness. I am very fortunate and lucky to be doing science in America," said El-Sayed, who holds the Julius Brown Chair and is also the director of the Laser Dynamics Laboratory. "I want to thank my past and present graduate students and postdoctoral fellows, my colleagues, the administration and staff at Georgia Tech and UCLA who all helped me to do my science and get this honor. There was no limit to the support I received. El-Sayed’s citation reads, “For his seminal and creative contributions to our understanding of the electronic and optical properties of nano-materials and to their applications in nano-catalysis and nano-medicine, for his humanitarian efforts of exchange among countries and for his role in developing the scientific leadership of tomorrow.” He..."  
El-Sayed continued, page 3

Advanced Wood Products Laboratory a center for instruction, research

Robert Nesmith  
Communications & Marketing

On the outskirts of campus, the Institute’s Advanced Wood Products Laboratory (AWPL) promotes its unique, three-fold mission: Teach, research and promote.

Bridging the gap between continuing education and academic instruction, the lab, part of the College of Architecture, offers continuing education credits for learning on computer numeric control (CNC) wood-cutting machines as well as a senior furniture design class primarily for Industrial Design (ID) students.

"(CNC) is the industry standard," said Alan Harp, College of Architecture (COA) research scientist and instructor at AWPL. "It offers not only precision, but also repeatability, economy and the ability to change designs on the fly."

The lab is able to use and instruct on the latest machines thanks to a partnership initiated by the late COA Dean Thomas Galloway. SCM Co., headquartered in Duluth, Ga., provides the precision machines.

In return, Harp says that Tech allows SCM to perform demonstrations for its customers.

Cutting class

Each semester, the advanced woodworking class instills in seniors what Harp calls the "Tech directive": Design with the manufacturing process in mind. "The class makes the connection between design and actual construction."

Using computer-aided design (CAD) software, students provide the measurements and designs they want to use. The CNC machines, equipped with a variety of cutting tools and the ability to cut at any necessary angle, use a 4-foot by 8-foot piece of plywood or medium-density fiberboard (MDF) and cut all the pieces out at one time. These automated helpers are essentially an 8-foot-square metal box, with all tools and materials needed safely enclosed.

"You effectively cannot design furniture [in a production capacity] without CAD," Harp said. "It’s imperative."

Through the class we’re trying to get students to understand what can be done with CAD and CNC technology.

"I tell every class that the CNC is capable of very accurate mistakes," Harp said. "It’s as accurate as your measurements and drawings.”

The classes—there also is an Intro to Wood Materials course—are not only for ID students, as Harp recalled instructing a Management major in his latest class.
One caveat with the class. Students must learn the difference between designing on a computer screen and design in reality. "They may never make another piece of furniture in their lives, but now they know the difference between what they sketched and what can be made," he said.

I've been pleased by the quality of output from the students. I'm pleasantly surprised at how well the students do that have never taken on a project of this complexity."

For the first few weeks of the furniture design course, Harp instructs them about using wood and prepares them for using the shop. Students keep track of their design time and actual fabrication time, which is generally about half and half. The more complicated pieces—Harp says—usually need redesign.

During the last few semesters, students have participated in a design partnership with home furnishings store Crate & Barrel. Students had to make design sketches reviewed by the furniture store, along with a quarter-scale mockup, a full-scale mockup and then a final project—the real piece of furniture. "The majority of students I get have never built anything before, especially furniture." And Harp sees a direct benefit to corporate partnership: Establishing a rapport with these companies helps open pathways for his students. "By offering high-quality prototypes to these companies, we're increasing our students' interactions with them," he said.

The Lab also offers continuing education classes throughout the year on machine-compatible CAD programs for professional customers who have purchased a unit from SCM. In the future, Harp wants to expand the lab's software courses.

Attendees are both individuals and those working in major furniture-design companies. The lab presents two or three courses each month, mostly introductory that and programming and operation classes for Xilog/AlphaCAM software, which instructs the machines. Both those inside and outside the wood products manufacturing industry are welcomed to take courses.

Computer-aided woodcutting machines make it easier for an individual or a small shop to produce furniture and compete, as the necessary software and a capable CNC machine would cost roughly $100,000. "One person with this machine would be the equivalent to three without," Harp said.

The Lab also partners with the Center for Assistive Technology and Environmental Access (CATEA). In the future, Harp wants to expand the lab's software courses, creating more offerings for professionals. And he wants to educate members of the Institute's community about what the lab offers. During the summer semester, he instructed a group of Architecture professors about the lab's services.

Best in show

Twice a year, he takes the ID students to Highpoint Furniture Market in Highpoint, N.C., to show the variety of computer-designed and CNC-cut furniture available on the market. While some students decide to pursue this as a design career, Tech does not offer a furniture-design program. Harp recommends students to graduate schools with a furniture program.

Regardless of their previous experience—or lack of it—Harp's students fare well in two biennial national furniture-design competitions. Last year, at the Association of Woodworking and Furniture Suppliers (AWFS) Fair in Las Vegas, seven works from Harp's senior design studio class were chosen—four, each with one piece, won an award. Two won second place in their categories, and two won honorable mention in their categories.

The International Woodworking Machinery & Furniture Supply Fair (IWF), held at the World Congress Center in Atlanta since 1995, has become a must-attend event for Tech students. "There was more quantity of quality than before," Harp said. "It shows. Judges selected for this year's show, the IWF received more than 500 submissions for the fair. Tech had three winners this year: one third-place winner in Case Goods, and one each in third and second place in the Ready-to-Assemble category.

Real-world research

While teaching both Tech students and professionals takes roughly half of the AWFL’s operations, the Lab is also a center for research. "We are technically a research facility," Harp said. Part of the Lab's directive is to advance the use of technology in the secondary wood products industry through research and outreach. "AWFL recently secured a grant through the state’s Traditional Industries Program for Pulp and Paper (TIP), a research partnership between the state, the University System of Georgia and its three traditional industries: textiles and carpet, food processing, and pulp and paper. "At AWFL, state-sponsored research focuses on the retail end of the tree's food chain," said Russell Gentry, associate director of Research. "Our focus is on the products and processes of product in the retail market."

Gentry's group is embarking on the third step of a study on juvenile pine—a abundant in Georgia and the Southeast. They are continuing evaluation of juvenile pine through material characterization and product development, including the development of wood and glass-fiber composites, which could aid the industry in several ways by using the lower-grade lumber in new ways. "A lot of these forest resources were grown for the pulp and paper industry," Gentry said. "[In the states] they're not being fully used, due to paper-production moving overseas, recycling efforts and less paper usage overall." Since there currently are no engineering applications or economic incentives for these juvenile pines, landowners are not thinning out their forests, which is needed for the larger trees to mature. "We're trying to provide motivation for the landowners to do so."

Testing has yielded very promising results in the technology, Gentry says, but the "economic proof" is lacking. "We are making a stronger wood product with lower-grade material," he said. "We have yet to demonstrate that it's economically viable."

Gentry is currently traveling around the Southeast, working to arrange continued collaboration from companies that would actually make the new product and benefit from—the products. Results could lead to more profit for lumber-growers.

Harp started working at the Center for Assistive Technology and Environmental Access (CATEA) after earning his ID degree from Tech. "My specific interest is in furniture design," said Harp, who adds he seeks more interaction with furniture companies from not only a research standpoint, but also from that of design. "My goal is to get more sponsorship in classes," Harp said. "This also helps broaden our customer base beyond just SCM."

And Harp's goals for students extend beyond the class and Institute, as well. "I tell my students, "Once you graduate, keep in touch with me, because it's your job to help other Tech graduates find jobs."" Harp said.

For more information...

Advanced Wood Products Laboratory (AWPL) is a unit of the University System of Georgia.

www.coa.gatech.edu/awpl

W W W. W H I S T L E. G A T E C H. E D U
At the time, the company was Response’s leadership, Hundt and Trapp-Lingenfelter initially visited Spectral Response to help streamline the way the company initiated product orders. After developing a value stream map—a diagram used to analyze the flow of materials and information required to bring a product or service to a consumer—they suggested the project focus on the entire manufacturing floor plan. “The factory floor was being driven by the way orders were loaded. If a customer called, we had to figure out a way to get it done, whether it was working nights, weekends or three shifts,” Melendy recalled. “But as our business grew and the margin pressure was layered on top of that, we didn’t have that luxury any more. We had to take an order from a customer and make sure our supply chain commitments matched up to our manufacturing processes.”

After meeting with Spectral Response’s leadership, Hundt and Trapp-Lingenfelter both thought the company’s manufacturing process would benefit from a cellular design. At the time, the company was arranged in functional departments that caused excess work-in-process, long lead times and lack of flexibility. Cellular manufacturing, sometimes referred to as cell production, arranges factory floor layout into semi-autonomous and multi-skilled teams that manufacture complete products. These more flexible cells are able to manage processes, defects, scheduling, equipment maintenance and other manufacturing issues more efficiently.

After training the entire 157-member workforce on lean manufacturing principles, a cross-functional team of employees examined the “before” process, brainstormed ideas and used lean tools to highlight areas of improvement. The team decided to shut down operations during the week of July 4, 2007, to rearrange all of the equipment into nine different cellular production lines.

A worker at Spectral Response in Duluth inspects a circuit board before it is shipped to a customer. Tech’s Enterprise Innovation Institute assisted the company with improving its manufacturing processes.

“We used to refer to the floor plan as the snake, and a product had to travel through the entire snake, meaning it was in a single file. If we started a product on Monday, it might be ready to be shipped on Friday,” said David Shockley, vice president of operations. “With the cell production, we can have nine parallel lines—much shorter in length—producing products at once. Now, products are ready to be shipped within 48 hours after the order is launched in the system.”

Not only did the cellular design reduce the length of time from the initiation until it was ready to be shipped, but it also helped with orders that needed to be reordered or returned. “The supply chain management team, along with the Lean Team, decided that we would be better off creating one cell to handle the full cell support,” Shockley noted. “In July 2008, we implemented cell No. 10, our high wastage product. We are committed to this being a never-ending, continual process.”

IN BRIEF:

**Ombuds combining**

The three Georgia Tech Ombuds functions—faculty, graduate student and staff—will be combined into one office.

Under the new structure, the Ombuds office will report to the Institute president through the Office of the Provost.

Engineering Professor Emeritus Nad Davidson and Physics Professor Emeritus Ed Thomas are the faculty ombudsmen; Engineering Professor William (Russ) Callen is the graduate student ombudsman; and John Schultz is the classified staff ombudsman.

While renovations are under way to provide a centralized office, the Ombuds office will remain in Suite 501 at 400 10th Street, near the intersection of 10th and Hemphill. A new Web site is under construction. The phone number will remain 385-6571.

**Retired dean Hawkins dies**

Robert G. Hawkins, first dean of the former Ivan Allen College of Management, Policy and International Affairs, died in Spencerport, New York, Aug. 22. He was 72.

An economist and academic, Hawkins was dean of the Ivan Allen College of Management from 1995 to 1998. During his tenure, Hawkins helped shape the vision of the college, emphasizing the Institute’s role in global economic development.

Prior to leading IAC, Hawkins served as dean of the School of Management at Rensselaer Polytechnic Institute for eight years.

In addition to his early academic career at New York University, Hawkins served as a consultant to the USA, the U.S. Treasury and the Port Authority of New York.
**Arts & Culture**

**September 9**

Bernard Amadei, founder of Engineers Without Borders USA, presents the Woodruff Distinguished Lecture, “The Role of Engineers in Poverty Reduction: Challenges and Opportunities,” from 11 a.m. to noon in the Fenn Center for the Arts. The event is rescheduled from April. For more information, visit www.me.gatech.edu.

Boston University Assistant Professor Catherine Ngalit-Mbemba presentsthe Application of Molecular Diagnostics in Global Health,” from 11 a.m. to noon, in room 1128 of the Institute for Bioengineering and Bioscience building. For more information, visit www.chemistry.gatech.edu.

**September 10**

College of Architecture alumni Merrill Ellman and Mark Scogin speak as part of the Architecture Centennial Lecture Series, from 6 to 7 p.m., in the Architecture Auditorium. The series, celebrating 100 years of architecture education at Tech, will continue through the fall semester. For more information, visit www.coe.gatech.edu.

Sociologist Jason Owen-Smith presents “Funding Human Embryonic Stem Cell Research: Science and Scientists,” at 3:10 p.m. in room 321 of the Student Center. For more information, visit www.inta.gatech.edu.

University of California, Irvine, Professor Reginald Penner presents “Ingredients: Metal Nanowires and Viruses,A Recipe for a Universal Biosensor,” from 10 a.m. to 12 p.m., in room 311 of the Materials Science and Engineering building. For more information, visit wwwmse.gatech.edu.

**Faculty/Staff Development**

**September 10**

A welcome reception sponsored by the Center for the Study of Women, Science and Technology and the Women’s Resource Center for new women faculty and administrators will be held from 5:30 to 7 p.m. in the Klaus auditorium. For more information, visit www.womenscenter.gatech.edu.

**September 11**

The Undergraduate Research Opportunities Program (UROP) and the Center for the Enhancement of Teaching and Learning (CETL) present “Mentoring Undergraduate Researchers: A Workshop for Faculty Post-Docs and Graduate Students,” from 11 a.m. to 1 p.m. in the Gondy Room of the Wardlaw Center. For more information, visit www.cetl.gatech.edu.

**Ongoing**

The Office of Organizational Development offers an Emergency Preparedness certificate consisting of several courses. For more information on scheduling or for other classes offered, visit www.orgdev.gatech.edu.

**Miscellaneous**

**September 5**

The Georgia Tech Police Department’s Emergency Preparedness Office presents “Get Ready George Tech,” from 9 a.m. to 11:45 a.m. in room 256 of the Global Learning Center, to show how the Institute is prepared to deal with emergencies. In recognition of September as National Preparedness Month, topics covered include fire safety, weather hazards, suspicious packages and a demonstration by Tech’s K-9 unit. To register for “GT Safety Day,” visit www.trainsweb.gatech.edu.

**September 17**

Members of the Georgia Tech Presidential Search Committee will examine the process, receive input and answer questions in several one-hour sessions during a public forum, from 9 a.m. to 3 p.m. in the Student Center Theater. For more information on the sessions for faculty, staff and students, visit www.gatech.edu/president/search.

**September 25**

Join Georgia Tech’s team of the Kaiser Permanente Corporate Challenge, 5K, 7 p.m. at Turner Field. Registration is open until Sept. 24 and the cost is $30 per person. Van transportation will be provided from the Campus Recreation Center. For more information, visit www.crc.gatech.edu.

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**Classifieds**

**Automobiles/Motorcycles**

80 NPU 49cc scooters, vintage and modern. Amazing colors, only $1,599 with helmet, gloves, warranty, riding lesson. 770-757-6489.

2001 silver Ford Focus ZTS, 109,000 miles. Clean history, gray leather int. Pcs., $6,000. OBO. Call 404-431-4135 or e-mail donna.castenell@business.gatech.edu.

**Real Estate/Rentals**

Roommate needed: 3BR/2BA house in Dunwoody, near I-20. Access to kitchen, living room, washer (and dryer) and large yard. Non-smoking and drug-free environment. $550. Call 404-610-4517 or e-mail greentjen@bellsouth.net.

For rent: 3BR/2.5BA, 2-level condo just off Decatur Square. $1,500. 1 min. walk to Decatur Square. Price includes parking. 5 min. drive to downtown. 5 min. walk to Decatur Square MARTA.& 1BD, $750. Call 404-364-1267 or visit http://tinyurl.com/4rnf58.

For rent: 2BR/2BA Peachtree Hills, 10 min. from Tech. $2,000/mth. Spacious, huge deck, private back yard, quiet. Call 404-985-1398 or e-mail bchblt@moa-labs.com.

For sale: 3BR/3BA home in Powder Springs neighborhood. Exc. schools. FH on first floor. SS appliances and granite in kitchen. Spacious master BR with spa bath. Full basement. Forced, wooded back yard. $340,000. MLS ID 3692996. E-mail: heather.sentry@ap.gatech.edu for info and pics.

60 acres for sale. Ideal horse farm, min. from Alpharetta. Call 770-479-2179.

**Sports/Fitness/Recreation**


Above-ground pool, 5 ft. deep. Includes ladder and pump. Only used twice. $50 or best offer. E-mail jae.colins370@yahoo.com.

**Miscellaneous**

Low-boy dresser, 5-foot by 3- foot, 9 drawers, with attachable 3-foot x 3-foot mirror. Dark brown wood. $40. Also, Entertainment center cube, 4-foot square with space for TV, VCR, bookshelves and storage. Dark brown wood. $20. Email rob.luck@library.gatech.edu.

American high-boy chest, dark walnut, very nice, $285. Roomy locking desk. 5 ft x 5 ft., Walnut desk. $225. E-mail linda.newton@ece.gatech.edu for pics, info.

**Furniture/Appliances**

For sale. 5BR/3.5BA in Roswell neighborhood. Exc. schools. FH on first floor. SS appliances and granite in kitchen. Spacious master BR with spa bath. Full basement. Forced, wooded back yard. $340,000. MLS ID 3692996. E-mail: heather.sentry@ap.gatech.edu for info and pics.

80 NGP 49cc scooters, vintage and modern. Amazing colors, only $1,599 with helmet, gloves, warranty, riding lesson. 770-757-6489.

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