CIMS City

RIT’s thriving manufacturing complex offers help in creating environmentally friendly technology

More than 40 students work at CIMS, including Kate Kimmel, a graduate student in RIT’s public policy program.
The EA-6B Prowler jet first saw action more than three decades ago in the Vietnam War. They are still in service, but, as components wear out and become obsolete, it can be difficult and expensive to keep the aging planes flying.

RIT’s Center for Integrated Manufacturing Studies (CIMS) is helping the Navy extend the useful life of the Prowler – and save millions of taxpayer dollars.

Elsewhere in the extensive CIMS complex, researchers are studying ways to use fuel cells and alternative fuels in buses, trucks and other public transportation. RIT will receive $4 million in federal funding through the Surface Transportation Reauthorization Bill recently passed by Congress for this work. The goal is to improve the performance, service life and safety of America’s public transportation fleet.

In yet another area of CIMS, engineers and technicians are analyzing components used in making toner cartridge to help manufacturers reduce waste and improve the quality of these products. Earlier this year, CIMS won the New York State Environmental Excellence Award for developing a testing system that enables reliable reuse of toner cartridges.

All of this work and a host of other projects come under the broad umbrella of “sustainability”–
a concept that holds tremendous importance for the future.

“The major challenges facing industry today involve the impact of industrial development on the environment,” says Nabil Nasr, director of CIMS.

Skyrocketing fuel prices are one symptom of the mounting problem. The United States, representing 5 percent of the world’s population, consumes more than 25 percent of the world’s annual energy output.

Besides the issue of dwindling resources, the industrialized world generates staggering quantities of waste, including a growing amount of consumer electronics containing lead, mercury and other hazardous materials.

Many nations are implementing environmental policies that require producers to be much more responsible for the environmental impact of their products. Automotive, electronics and other manufacturers are under pressure to design products to increase energy efficiency, reduce greenhouse gas emissions and decrease waste.

“There’s a crucial need to design and manufacture products in an environmentally sustainable fashion – to minimize negative impact on the environment and increase economic viability. At CIMS, our focus is on sustainable design, lifecycle engineering, resource recovery and remanufacturing – all aspects of sustainable manufacturing,” Nasr says.

“We want to make sure RIT is a very serious entity in this field.”

### The start of something big

Nasr pioneered RIT’s first major effort in the area of sustainability in 1991, when he was a faculty member in RIT’s Kate Gleason College of Engineering. He discovered that, while many universities were working on recycling, very little research was being done on “remanufacturing” – the process of re-engineering components and equipment to extend their useful life. Within a few years, Nasr and a growing team were at work on projects with the auto industry, copier and printer cartridge manufacturers, the U.S. Department of Energy, and companies including Eastman Kodak Co. and Xerox Corp. One early project involved redesigning decommissioned Navy ships to allow them to be put to new uses – instead of being sent to the scrap yard.

“Over the past seven years, the collaboration between RIT and the Office of

CIMS at a glance

Established in 1992, RIT’s Center for Integrated Manufacturing Studies is housed in the Louise Slaughter Building, which opened in 1997. Facilities include:

- 170,000 square feet of laboratory and office space.
- Six large manufacturing bays.
- 21 specialized laboratories including: design capture/metrology lab; integrated diagnostics and prognostics lab; materials engineering lab; systems performance and reliability lab; workplace ergonomics lab; product evaluation lab.
- 10-room, 400-seat training and conference center.

CIMS assists companies and organizations of all sizes to develop solutions to their technical and business challenges. CIMS has worked with companies throughout the United States.

For more information about working with CIMS, go to www.cims.rit.edu.

“CIMS is self-sustaining: Its operating costs are covered by funds received from the organizations with which it works. Sponsored research programs this year are expected to reach the $9 million mark.

U.S. Representative Randy Kuhl Jr. (R-Hammondsport, N.Y.) believes that “the work at CIMS is critical to the national interest because it does two things important to everyone – improves the safety of our soldiers, and reduces the costs associated with purchasing new equipment. CIMS has a long track record of saving the government millions of dollars through the Department of Defense.”

### From concept to concrete

Nasr attributes the growth to the practical focus of the center. CIMS, in keeping with the RIT philosophy, takes projects from research through to implementation.

“Our motto is the customer is always right and failure is not an option. We have a sincere desire for our sponsors to succeed, whether it’s Joe’s Manufacturing Shop or Hewlett-Packard or the Department of Defense. Our goal is always to exceed expectations.”

Lester Cornelius, president of Optical Technologies Corp. and chair of the International Imaging Technology Council, has been working with NC3R since 1998. His company manufactures printer and copier components and coatings for cartridge remanufacturers.

“The work done at CIMS has raised the level of quality in the industry,” says Cornelius. “They’re helping U.S. companies compete with low-cost imports. Plus,
Defense research in line for additional federal funds

Both the House and Senate versions of the FY 2006 defense appropriations bill include additional funding for CIMS’ Defense Modernization and Sustainment Initiative with the Office of Naval Research. The House bill includes $3 million and the Senate bill recommends $4 million. The final amount had not been determined as of press time.

CIMS has worked on a number of significant projects for several units of the U.S. Department of Defense, resulting in substantial cost savings and extending the life of military systems and equipment. The center’s work on the fleet of light armored vehicles, for example, will extend their life by 20 to 25 years and will save the Defense Department approximately $42 million.

The House funding for FY 2006 was supported by Rochester area Congressman Randy Kuhl (R-Hammondsport) and Tom Reynolds (R-Clarence). The Senate funds were requested by Senators Charles Schumer and Hillary Clinton.

Over the past eight years, CIMS has received $21 million in support of the defense research program.

A growing reputation

Nasr has traveled all over the U.S. and around the world to work with organizations on projects related to environmentally benign manufacturing, remanufacturing and sustainable design. He is a member of the National Academy of Science’s Board on Manufacturing and Engineering Design and serves as chair of the Remanufacturing Industries Council, representing 73,000 U.S. companies.

He is a member of the National Science Foundation’s Environmentally Benign Design and Manufacturing Team, and on behalf of the NSF, he is organizing a series of international conferences in this field. The third will take place in Brazil in 2006. Earlier this year, he led an international workshop on sustainable manufacturing in China.

Likewise, CIMS receives a steady stream of visitors from around the world, who come to observe, ask questions and collaborate.

“CIMS’ overarching mission is to enable U.S. manufacturers to become more competitive in the global economy,” says Nasr. “And the primary driver for all of our activities is to ensure that U.S. manufacturers stay on the leading edge of technology. In order to do that, it is important for us to be aware of what is going on in other parts of the world.”

“In addition, many U.S. companies have overseas operations and CIMS is uniquely positioned to have an impact on society and the environment through these partnerships.”

A team effort

Nasr says the key to the success of CIMS is the people.

“I’m very proud of the team we have assembled,” says Nasr. The staff has grown to more than 100, including engineers, technicians and administrative personnel. Faculty members from within RIT and other universities as well as industry experts do research at CIMS. Graduate students and 40 or more students on co-op assignments are employed at the center at any given time. Working at the center provides outstanding experience, students say.

“I’ve worked on several projects. In the end-of-life strategies for fuel cells project for the Environmental Protection Agency, I was involved in creating ways to attack the issue of waste when – if – fuel cells become a larger part of the market,” says Kate Kimmel, a graduate student in RIT’s public policy program. “That was in line with my bachelor’s degree in environmental science (from State University of New York at Brockport), while using analysis techniques that I have learned in the master’s program.”

“The expectations are high,” she adds. “Students work on a similar level with everyone else.”

Vicki Parnell, a fifth-year mechanical engineering student, has held a co-op job at CIMS for four quarters. She’s centering her graduate thesis on research related to CIMS’ ongoing work with Marine Corps Light Armored Vehicles (LAV).

“The investments that we have made in RIT’s Center for Integrated Manufacturing Studies have paid for themselves many times over,” says U.S. Senator Charles Schumer. “The research has improved the effectiveness and lifecycle of these military systems, while enhancing the safety and security of our soldiers on the field of battle.

“Also, let’s not forget that research investments like this have a big impact on the region’s economic development.”

A bright future

Nasr would like to expand the role of CIMS in the education of RIT students. He envisions an academic program in sustainable product development that would integrate social, environmental and economic considerations into undergraduate and graduate degree programs including a multidisciplinary Ph.D. in sustainable engineering systems.

“There’s a need for college graduates that have the knowledge in sustainable engineering, policy and economics,” says Nasr. “Students in all disciplines – engineering, business, science, art, photography, public policy – would benefit from courses related to sustainability. I believe RIT is in an excellent position to offer the first doctoral program in this field, and the Ph.D. would be a catalyst for making the university known worldwide for sustainability.”

These potential academic programs would be part of a future initiative being called the Sustainability Institute, a collaboration between several RIT colleges, academic and technology research centers, industry, and external stakeholders regionally, nationally, and internationally.

“What drives me is that we really can make an impact,” says Nasr. “There’s so much that can be done. We can have a role in reducing the burden on the environment while providing tremendous economic benefit and improving national security.

“It’s a terrific time for us, and this is just the beginning.”

Kathy Lindsley