Simulated Global Climate Testing
Lawrence Tech is enhancing its reputation for cutting-edge research by building an Environmental Test Chamber for testing vehicle components for military and other uses. This latest addition to CIMR will include an actuator capable of delivering impact blows with up to 150,000 pounds of force on components being tested. The environmental/loading chamber will replicate the impact of both repeated and static loads in simulated climates ranging from Iraq to Antarctica.

The Environmental Test Chamber will:
 Significantly advance U.S. Army materiel design, testing, evaluation, and durability, and result in the deployment of new high-strength, lower-weight vehicle armor to protect troops and save lives.

Work with the Best
Since his arrival at Lawrence Tech from the private sector in 1988, Dr. Nabil F. Grace, distinguished professor, chair of the Department of Civil Engineering, and CIMR director, has won more than 20 grants and contracts totaling more than $13 million to advance innovative materials research. With more than 25 years of practical experience with carbon fiber technology, Dr. Grace is an international expert in bridges and transportation infrastructure. He has authored over 100 technical papers in national and international conferences, journals, and magazines. He also holds three patents related to carbon fiber structures for transportation infrastructure and lightweight armor.

Dr. Grace is widely sought after as a state, national, and international expert on innovative carbon fiber-strengthened concrete designs that have much lower lifecycle costs and greater service life, resulting in outstanding sustainability. He is one of only two academic researchers on the Federal Highway Administration’s Fiber Reinforced Polymer Composite Bridge Technology Virtual Team.

CIMR Can Help
The Center for Innovative Materials Research at Lawrence Tech can help you develop new and innovative products that make a positive difference in people’s lives and solve important and challenging problems.
 What product or service problems are you working to solve?
 What new materials are you developing?
 What material characteristics are you seeking to achieve?
 How long do you want them to last?

CIMR’s facilities and experienced university research team can get you the answers you need!

Contact Us Today
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“...the center is a prime example of the intersection of high technology and homeland defense. Building the center will help create jobs today, putting the technology the center develops to work will create jobs tomorrow, and all of it will help protect America’s troops. This is a win for our economy today and a win for its future.”

— Michigan Governor Jennifer Granholm

Nabil Grace
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Partnersing for Your Success

Innovation is the key word at the Center for Innovative Materials Research (CIMR) at Lawrence Technological University. CIMR researchers are working on innovative materials and advanced solutions for defense, homeland security, transportation infrastructure, construction, and automotive applications, to:

• save lives,
• improve quality of life,
• cut life-cycle costs.

Make it lighter, stronger, and cheaper. Boost fuel efficiency, and build significant economic benefits.

Use expert CIMR researchers and facilities to explore:

• New materials that require armoring weighing less than 100 pounds per square foot.
• Carbon fiber wind turbine blades that can withstand harsh changes in weather or climate.
• Advanced materials for commercial vehicles that reduce weight and improve fuel economy.
• New generation of long-lasting highway bridges.
• Components that incorporate high-performance materials.

CIMR researchers are working with the U.S. Department of Transportation and the Michigan Department of Transportation to develop high-strength, lightweight carbon fiber-reinforced polymer (CFRP) automobile and highway bridge sections that are lighter, safer, and more durable than steel or concrete. In 2002, Lawrence Tech's Center for Innovative Materials Research (CIMR) was selected to develop prototypes for a high-strength, lightweight automobile body that could be used as a body-on-frame configuration.

Accent on Advanced Materials

Innovative and advanced carbon fiber materials are being developed in one-of-a-kind labs that can help reduce military vehicle and body armor weight while providing superior protection and durability for our troops.

On the home front . . .

Lawrence Tech’s CIMR team is developing and testing materials that strengthen and prolong the life of critical facilities such as office and commercial buildings, bridges, military complexes, airports, and highways.

Let Lawrence Tech help you understand the performance characteristics of:

- high-strength, lightweight carbon fiber composites
- steel, aluminum, composites
- other advanced materials

Bridges to the Future

Safeguarding assets . . . More than 72,000 highway bridges across the United States are structurally deficient and more than 80,000 are functionally obsolete.

Lawrence Tech is playing a lead role in the research, development, and deployment of innovative, high-strength bridge technology designed to replace those structures . . . and avoid such tragedies as the 2007 bridge collapse in Minneapolis that claimed 13 lives.

Work at CIMR is advancing the industry's current best practices for bridges and infrastructure in the design of new non-corrosive carbon fiber reinforced polymers (CFRP) for building and reinforcing concrete bridges.

Lawrence Tech is also conducting durability testing using this technology in I-beam and box-beam bridge construction.

In 2001, Lawrence Tech is in collaboration with the City of Southfield, Oakland County Highway Department, Figg Bridge Engineers, and MOIT, built the nation’s first highway bridge using CFRP carbon fiber instead of steel. The pioneering Bridge Street Bridge project led to CIMR being awarded a $900,000 grant from the Michigan Economic Development Corporation (MEDC) Jobs Fund in 2007 to deploy the CFRP technology on new bridges in 2010 in partnership with MOIT.

CIMR: Where Research = Results

CIMR researchers are collaborating with the U.S. Army Tank Automotive Research, Development and Engineering Center to significantly advance material design, testing, evaluation, and durability of military vehicle armor.

Results:

• Deployment of new high-strength, lower-weight vehicle armor to protect troops and save lives.

CIMR researchers are working with the U.S. Department of Transportation and the Michigan Department of Transportation (MDOT) to develop high-strength CFRP for over 100 years – twice the normal life span – by using innovative materials during construction.

Results:

• Lower life-cycle repair and maintenance costs, fewer detours and traffic disruptions, and substantially safer travel for motorists.

Lawrence Tech’s Center for Innovative Materials Research is doing research on carbon reinforced polymers for construction of new non-corrosive carbon fiber reinforced polymers (CFRP) for building and reinforcing concrete bridges.

Lawrence Technological University has partnered with the National Science Foundation for the Bridge Street Bridge project and the Penobscot Narrows Bridge project.

CIMR researchers are working on cutting-edge testing technology to significantly advance materiel design, testing, evaluation, and future generations by improving the nation’s infrastructure.

“Research is happening right here in Michigan at Lawrence Technological University that isn’t happening anywhere else in the country. Lawrence Tech’s Center for Innovative Materials Research is doing research on carbon fiber composite materials and testing and ultimately will result in bridge structures that will last longer than ever before. The Michigan Department of Transportation has recognized CIMR as a Center for Excellence in recognition of this important work. We are proud to partner with Lawrence Tech as CIMR develops innovative technologies that will benefit current and future generations by improving the nation’s infrastructure.”

— Kirk T. Steudle, director, Michigan Department of Transportation

Inside CIMR’s Testing Facilities

Fired Up To Help You

Each year catastrophic fires in the United States claim thousands of lives and cause billions of dollars in property damage.

Lawrence Tech is in meeting the challenge by examining how structural materials respond to very high temperatures.

CIMR houses one of the few Fire Chambers that enable researchers to conduct large-scale testing of structural components at temperatures of up to 2,500 degrees Fahrenheit and simulate conditions of the 9/11 tragedy at the World Trade Center. Large enough to fit a full-sized military Humvee, the Fire Chamber also lets researchers conduct tests on various components of military vehicles, especially those exposed to flames and fire on the battlefield.

Let the Force Be With You

Lawrence Tech’s Center for Innovative Materials Research has spent three years structurally testing areas to accommodate multiple projects, handling structures up to 100 feet long with both static and dynamic testing.

CIMR can help you achieve:

• Improved material characterization
• Advanced prototype evaluation
• Long-lasting, reliable products

CIMR Fire Chamber

The Penobscot Narrows Bridge, Maine’s first cable-stayed long-span highway bridge, opened in December 2006. In June 2007, Lawrence Tech was commissioned by the Federal Highway Administration, U.S. Department of Transportation, to perform field testing at the innovative cable-stayed bridge. Lawrence Tech’s work at the site includes developing measurement techniques and advanced analysis methods to determine the bridge’s dynamic behavior and materials performance under operational and non-operational conditions.

Lawrence Tech students prepare prestressed concrete bridge beam for a research project sponsored by the National Science Foundation.