

Lawrence Technological University Center for Innovative Materials Research (CIMR)

Lawrence Tech's CIMR is a national resource in the development of innovative materials for defense, Homeland Security, and infrastructure applications. Made possible by an \$11 million cooperative research agreement with the Army Research Lab (ARL) and the U.S. Army Tank Automotive Research, Development and Engineering Center (TARDEC), CIMR represents an unprecedented federal partnership with a private Michigan university. CIMR is a state-of-the-art laboratory for the research, development, and testing of carbon fiber composite materials for defense applications. The initiative supports Lawrence Tech's effort to become a regional leader in applied research of materials and structures, energy, and automotive engineering.



MTS Model 311 Four-Post Load Frame with Environmental Chamber

The MTS Model 311 Four-Post Load Frame is a high-force test system used for a number of material property tests. It can be configured to determine the compressive strength, elastic modulus, and Poisson's ratio of a composite material. The MTS machine can be set up with an environmental chamber that subjects a specimen to temperatures ranging from -200 F to 200 F. Strain gages can be attached to measure the elastic properties of the material.



ElectroPuls E10000 Linear-Torsion, All-Electric Test Instrument

This leading-edge instrument is used for dynamic and static testing on a wide range of materials and components (Instron 2011). It is capable of performing combined axial and torsional loading. The dynamic axial load capacity of the instrument is 2,250 lbs. and the static axial load capacity of the instrument is 1,570 lbs. The torsional load capacity is 880 in.-lbs. The displacement capabilities include a 60 mm linear stroke and a ± 135 -degree rotation for torsional load analysis. This instrument's configuration is the only one of its kind in the state of Michigan. Lawrence Tech uses it to test the combined axial and torsional behavior of new composite materials. The ElectroPuls can be set up with an environmental chamber that subjects specimens to temperatures ranging from -200 F to 200 F.



Comprehensive Environmental Test Chamber

This 3,600-cubic-ft., full-scale loading environmental test chamber allows researchers to subject structures to typical and extreme forces, such as rain, sun and humidity, several cycles a day. The floor is specifically designed to withstand 150 psi in a cyclic load, while undergoing temperature changes from -90 F to 185 F. The interior dimensions are 11 ft. 11 in. wide by 21 ft. 6 in. deep by 14 ft. high, offering a clear, usable work space.



Load/Fire Chamber

This fire-testing furnace is equipped to test structural components, such as armor, columns, beams, and floor systems, under extreme fire conditions to which they could be subjected in the real world. Using natural gas flame jets from nine burners, the furnace can reach a maximum temperature of 2,300 F (1,260 C). The interior dimensions of the furnace are 22 ft. 3.5 in. by 10 ft. 6 in. by 8 ft. 6 in. (6.8 m by 3.2 m by 2.6 m). Five viewing ports, three on the front and two on one side, permit real-time screening. The fire test facility has enabled researchers to investigate the response of armor and structural components to fire loading.



Structural Testing Center

The Structural Testing Center (STC) houses two large-scale structural testing frames capable of static and dynamic loading capacities up to 150,000 lbs. Two hydraulic pumps power the actuator. The STC contains five loading actuators for static and repeated loading. Measurements of loads, deflections, accelerations, and strains can be taken electronically. The STC has in-house construction capabilities for manufacturing various configurations of structural concrete elements and pre-tensioned and post-tensioned concrete components.



Series 216 Rotary Actuator

LTU's Series 216 Rotary Actuator is a heavy-duty, torque-generating device that operates under precision servovalve control. Matched with servovalves, transducers, and closed-loop control electronics, it is ideally suited for testing materials, structures, and components. The double-vane rotor design accommodates full-force application through 100 degrees of rotation. Matched reaction brackets, diaphragm flexures, and reaction bases allow the creation of versatile test configurations.

