

Integrated Rock Mechanics Test Systems (IRMTS)



The Integrated Rock Mechanics Test System was developed by DCI in response to a need for a compact triaxial rock mechanics test systems suitable for performing routine triaxial tests on plug-size rock samples. Integrated into a single desk-size test system, the systems include:

- High-stiffness, 2-column load frame with servo-controlled hydraulic actuator
- Triaxial test cell with in-vessel instrumentation for strain and load measurement
- Servo-controlled confining pressure system
- Servo-controlled pore pressure system
- System transducer signal conditioning electronics
- PC-based data acquisition and test control system

System Benefits

- Ease of sample loading leads to rapid test turn around.
- High-speed, PC-based, three-channel digital servo controller designed specifically for rock mechanics applications provides accurate and flexible test control.
- In-vessel instrumentation provides the highest possible accuracy of load and strain measurements.
- Compact size and economical cost allows rock mechanics capability can be added to any laboratory.

System Features

- The sample stack can be assembled quickly on the test cell lower closure. A hydraulic actuator then raises the assembly into the test cell. A reaction column slides under the lower test cell closure to react the axial and confining pressure loads, and eliminating the need for threaded or bolted closures. These features make test setup easy for the operator and allow for a rapid test turn-around.
- Confining system and pore systems are integrated into the test station with easy-to-follow schematics clearly silk-screened on the system panels, keeping the system compact and easy to operate.
- The IRMTS frame includes a large table top area where the operator has space to perform sample assembly.
- In addition to pore pressure control, the pore pressure intensifier provides precise volume measurement or control, allowing for measurement of pore volume compressibility or performance of pore pressure draw-down tests.

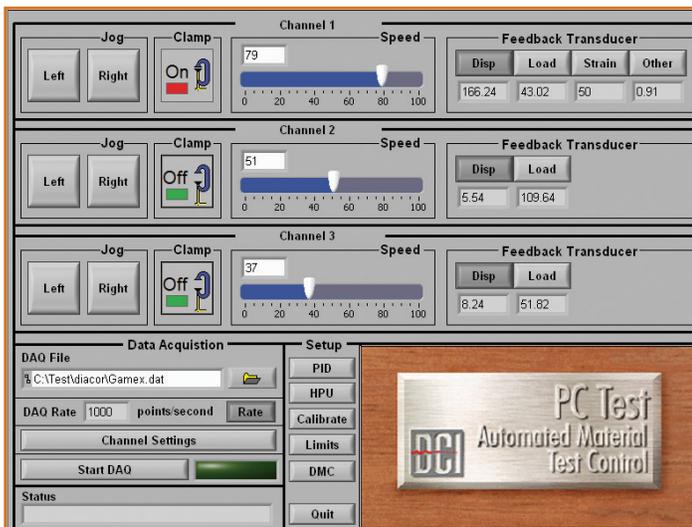
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DCI Digital Three Channel Test Controller

The DCI digital three channel test controller is designed specifically for triaxial rock mechanics tests. The three channels are dedicated to axial load, confining pressure and pore pressure. All three channels can be controlled in either displacement or force (pressure) feedback mode. In addition, axial load can be controlled with axial strain or transverse strain feedback to allow a wide variety of stress-strain paths that are typical in rock mechanics applications.

The digital three channel test controller is mounted in a rack-mounted enclosure which acts as a patch panel to connect all of the system transducers to the control system. This enclosure includes the high speed digital controller, as well as signal conditioning for the various system transducers, logic for averaging signals where needed for control feedback, as well as controls for the hydraulic power supply and emergency stop hardware.

The operator interface for the digital three channel controller runs on a PC that is rack mounted as well. The PC monitor can be rack mounted, or can be free standing. The operator interface allows the operator to control each channel manually, select feedback mode, calibrate transducers and so on. The operator can also select specific pre-defined test sequences. The PC monitor allows test data to be displayed to the operator during the test.



Typical Tests

Some typical tests that can be performed by the IRMTS include:

- Triaxial stress/strain measurement and modulus measurement.
- Uniaxial strain control tests.
- Pore pressure draw-down.
- Pore volume compressibility.

Custom Rock Mechanics Test Systems

If you need a rock mechanics test system for a research application, DCI can provide a system to meet your specifications. By combining the right set of system components, almost any testing requirement can be satisfied. Typical rock mechanics system components include:

- 2-column and 4-column, high-stiffness load frames with axial loading capacities up to 1,000,000 lbs. (4,500 kN).
- Triaxial test cells to accommodate test samples up to 4 in. (102 mm) in diameter.
- Confining pressure intensifiers and triaxial test cells up to 30,000 psi (200 MPa).
- Pore pressure intensifiers up to 15,000 psi (100 MPa).
- External and in-vessel temperature control systems for sample temperatures up to 3000F (150 0C) and 700 0F (370 0C) respectively.
- Pore pressure systems for transient and steady-state permeability measurements.
- In-vessel transducers for acoustic emission monitoring and P- and S-wave ultrasonic velocity measurement.

Specifications (IRMTS)

Sample Size:	1.5 in diameter x 3.0 in. long
Axial Stress:	33,000 psi (230 MPa)
Confining Pressure: (Lateral Stress)	10,000 psi (70 MPa)
Pore Pressure	5,000 psi (35 MPa)