Halliburton Geomechanics Laboratory

Accurate Analysis of Geomechanical Properties to Improve Exploration, Drilling and Completion Design, and Reservoir Management

The Halliburton Geomechanics Laboratory is one of the foremost geomechanics and rock fracture physics laboratories in the world. For nearly half a century, Halliburton researchers have investigated many areas including a wide variety of wellbore configurations, perforating schemes and formation rock types and have assisted operators worldwide in the geomechanics field.

Laboratory testing is the only direct way to determine the mechanical properties of rocks. The geomechanics laboratory provides core-based testing and engineering analysis to optimize reservoir performance and asset development—ultimately benefiting the industry in drilling, completion and production.

**Expert Personnel and Technology**

The heart of the geomechanics service is a team of experts with extensive technical and scientific experience in experimental geomechanics and rock physics. The team’s years of combined experience provide cross-disciplinary expertise in mechanics, geology, petrology, petrophysics, and seismology. This expertise is complemented with unique technologies and equipment.

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**Unique Capabilities Available at the Geomechanics Lab**

- Perform specialized tests and fracture studies on actual field cores, and simulate downhole conditions while studying fractures of those cores.
- Measure mechanical properties of field samples to obtain input data for computer models.
- Perform the complicated mechanical fracture-type studies of loosely consolidated sandstone.
- One of the few laboratories capable of performing mechanical testing of foamed cement.
- Extensive experience in testing unconventional reservoirs and other difficult rock types.

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**Figure 1** - Cutaway view of the polyaxial cell. The cell can provide horizontal stress anisotropy for up to three different layers under uniform pore pressure distribution.

**Figure 2** - Setting up the high pressure polyaxial cell for fracture experimentation. A sample block with dimension of $24 \times 12 \times 12$ inches can be fractured with maximum fluid pressure of 10,000 psi. Additional acoustic emission monitoring is available for fracture propagation.
Geomechanics Testing Services

Polyaxial and triaxial testing facilities are used to determine rock properties and study fracture parameters under in situ pressure and temperature conditions. The geomechanics laboratory provides cost effective testing with the following services:

- True-triaxial (polyaxial), triaxial and uniaxial testing for Young’s Modulus, Poisson’s Ratio, and compressive strength
- Brinell hardness test
- Brazilian tensile strength
- Generating and interpreting Mohr failure envelope
- Fracture toughness
- TWC strength (thick wall cylinder)
- Ultrasonic velocities (compressional and shear wave—Young’s Modulus, Poisson’s Ratio)
- Proppant embedment
- Operational applications for rock mechanical properties such as fracture stimulation testing

The engineering analyses of geomechanics and rock physics data are conducted through laboratory experiments using state of the art rock testing and monitoring equipment as well as sophisticated proprietary and commercially available geomechanical modeling software packages.

For more information about how the Geomechanics Lab can help make your wells more productive, contact your local Halliburton representative or email stimulation@halliburton.com.