Temco, Inc.

Design Excellence in Core Analysis Instrumentation

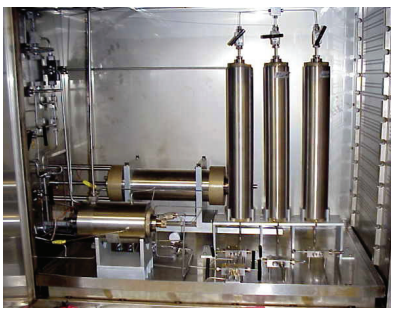
Custom Designed Core Flooding System

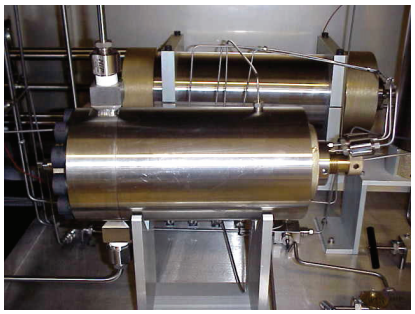
Temco offers their clients the unique service of a core flooding system designed and manufactured to the user's specifications. Temco has been providing this service to the Industry since 1981. Temco is able to use previously provided, proven flow designs for the development of these various core flooding systems. Temco's state-of-the-art, Custom-Designed Core Flooding Systems have been used for the following applications:

- Acidization Studies
- Acid Foam Rheology Studies
- Drilling Mud Invasion
- Enhanced Oil Recovery
- Formation Damage Testing
- Miscibility Studies
- MRI or NMR Core Scanning
- Relative Permeability
- Secondary Water Flooding
- Tertiary Water Flooding
- X-ray Core Scanning

The following is a brief description of the unique features is each of the above core flooding systems:

- **Acidization Studies:** Unique reverse flow option so that fluid can be injected in either flow direction in the core sample. This allows the end user to measure the ultimate return permeability. The system incorporates the pressure tapped core holders, so that the user can determine the depth of penetration of the acid response to the test core sample.
- **Acid Foam Rheology Studies:** The foam is generated using a unique shearing mechanism developed at the University of Tulsa, or the liquid and gas mixture is pushed through a long shear tube. This foam can then be injected in the core sample for testing.
- **Drilling Mud Invasion:** Please refer to the Formation Damage core flooding system that offers a high pressure drilling mud circulation pump, unique formation damage core holders, and reverse flow options.
- **Enhanced Oil Recovery:** Flow design to allow for secondary recovery, multiple slugs of various chemicals for Enhanced oil recovery studies, options for gas injection, and liquid CO2 injections. Pressure tapped core holders are utilized to monitor the flow of the recovered oil as it moves down the length of the core sample.
- **Formation Damage Core Flooding:** System that offers a high pressure drilling mud circulation pump, unique formation damage core holders, and reverse flow options.
- **Miscibility Flow studies:** A slimtube is added prior to the core holder for the mixing of the Liquid and Gas mixture, prior to the injection of the mixture into the core sample.





- **MRI/NMR Core Flooding:** Incorporates the non-magnetic FCH series core holders for measurement of the fluids in either high or low field MRI.NMR measurement devices. These core holders are placed on the measurement device and then any of the above core flooding systems is utilized with the core holder.
- **Relative Permeability Core Flooding:** Tests for steady state or unsteady state relative permeability. Liquid metering pumps are available for one or two phase injections. Metering pumps are also available for re-circulation of the test fluids. Gas injection using gas mass flow controllers. A two or three phase separator can be incorporated into the design for phase level measurement of the produced fluids/gases at pressure and temperature.
- **Secondary and Tertiary Water Flooding:** See the Enhanced Oil Recovery system above.
- **X-ray Core Scanning:** Incorporates the FCH series of core holders for linear or CT X-ray scanning. These core holders are placed on the measurement device and then any of the above core flooding systems is utilized with the core holder.

Each of these systems are available with computer data acquisition and control. Temco also offers in-house training, and on-site installation and training. Temco uses many of the components as outlined in the Temco catalog for these systems. Please refer to the individual catalog sheets for the specific information regarding a particular item.

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When requesting a quotation from Temco for a Core Flooding System, please provide the following information so that Temco can provide a detailed quotation for the apparatus that you require:

- Test Description: _____
- Injection Pressure: Max /Min _____
- Injection Flowrate: Max /Min _____
- Confining Pressure: Max /Min _____
- Operating Temperature: Max/Min _____
- Wetted Material: _____
- Electrical Requirements: _____
- Core Holder Style, Diameter, and Length: _____
- Accumulator Quantity and Size: _____
- Number of phases to be injected at one time: _____
- Corrosive Phases: _____
- Electronic Measurements Desired & Quantity:
  - Differential Pressure: _____
  - Injection Pressure: _____
  - Confining Pressure: _____
  - Outlet Pressure: _____
  - Gas Flowrates: _____
  - Production Rates: _____
  - Temperature: _____
  - *Please List Computer Controlled Items: _____

From this list, the experienced Engineering Department at Temco, Inc. can provide a quotation for your review. Prior to the manufacturing of the system, Temco can provide the system design to you for your review and approval. In this manner, you will receive a system designed to meet your expectations. Please contact the Engineering Department at Temco if you have any questions about the Core Flooding Systems from Temco, Inc.