A core flooding system is a system that flows a fluid (gas or liquid) through a core sample at controlled conditions and measures flow parameters. These systems can be used for:

- Stimulation studies
- Diversion of stimulation fluids
- Flow distribution in multi-layered reservoirs
- Steady state permeability measurement
- Relative permeability measurement
- Formation damage tests
- EOR tests and research
- Acidization studies
- Water flooding
- Drilling mud invasion

**Customized Flexibility**

Because of the wide variety of tests that might be conducted in a core flooding system, these systems are typically customized to meet the exact requirements for a specific application. This brochure outlines options available for each component in the core flooding system, to allow the user to specify the combination that will be best suited to their application.
Modular System Design
A core flooding system consists of several modules that are combined into a single system.
- Core holder(s)
- Pressure control system
- Upstream flow system
- Fluid separator system
- Differential pressure measurement module(s)
- Back pressure control system
- Data acquisition and test control system

Core Holder(s)
- Single or dual core holders
- Flow forward, reverse, parallel or in series
- Pivoting mount frame for horizontal or vertical orientation
- Roller-supported mount frame for easy movement and maintenance
- Radial confining pressure or triaxial loading capability
- Range of core diameters (1 ½” typical)
- Core lengths up to 12”
- Multi-tap pressure ports along the core length

Pressure Control System
- 10,000 or 15,000 psi options
- “Passive” pressure control with isolation valves
- “Active” pressure control with back pressure regulator

Upstream Flow System
DCI has designed a family of dual piston syringe pumps specifically for core flooding applications. These pumps use special algorithms to provide virtually pulse-less flow to drive fluid separator accumulators.
- Wide range of pressure, volume and flow rate capabilities
- Wetted parts stainless steel or Hastelloy C 276
- Tubing 1/8” or ¼” depending on flow rate requirements
- Gas injection system
Fluid Separator System
To be able to flow highly corrosive fluids through the core samples, the VPA pump drives a fluid separator accumulator. A typical system includes a bank of three or four of these accumulators so that multiple fluids can be staged for flow through the core sample.
- Air-operated valves to select the active fluid separator
- Wetted parts: Hastelloy C 276, Teflon and PEEK
- Typical specifications: 1000 ml, 10,000 psi

Oven
A custom designed, stainless steel oven typically contains the core holders and fluid separator accumulators. This allows core flooding tests to be conducted routinely to 300 °F. With special seal materials and other modifications to components housed in the oven, tests to 350° F, and even 400 °F are possible.

Differential Pressure Measurement Module
Accurate differential pressure measurement is the key to accurate permeability and other flow parameter calculations. These measurements include differential pressure measurements over the length of the core and between ports on core holders with multi-tap pressure ports. Selecting the optimum differential measurement transducer(s) depends on the differential pressure to be measured as well as the system pressure rating. DCI engineers can help select the optimum differential pressure transducers for a specific application.

Back Pressure Control System
The back pressure control system controls the pore pressure in the system as well as providing a means of measuring flow rates of fluids flowing through the core(s). This includes measuring different flow rates through two different core samples in dual core flood systems, as well as the relative flow volume of two different fluid phases flowing out of a core. Options include:
- VPA in pressure mode to control back pressure and measure volume in
- Dome-loaded back pressure regulator with electronic back pressure controller
- Coriolis mass flow meter. Measures mass flow rate and density allowing flow of two different fluid phases to be measured and differentiated.
Data Acquisition and Test Control System

Data is acquired automatically from each transducer in the system. This PC-based system allows the operator to specify which data are collected for a specific test as well as the data collection rate. The same PC program provides test control capability for the system. A touch-screen interface allows the operator to set the flow configuration, the back pressure control mode, the active fluid separator accumulator, set oven temperature, control the VPA pumps, etc. with just a few clicks on the screen. The flow configuration and other test parameters are displayed graphically to the operator. Other screens allow for functions such as individual control of automated valves for maintenance purposes, entry of transducer calibration values, etc. This data acquisition and test control software is typically customized to each specific test system.
# Core Flood System Configuration Worksheet

## Types of tests to be conducted:

### Core holder(s)

<table>
<thead>
<tr>
<th>No. of core holders:</th>
<th>❏ One</th>
<th>❏ Two</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Orientation:</th>
<th>❏ Horizontal</th>
<th>❏ Vertical</th>
<th>❏ Pivoting</th>
</tr>
</thead>
</table>

### Core diameter:

### Core length:

Max: __________  Typical: __________

### Core stress state:

<table>
<thead>
<tr>
<th>❏ Radial Stress Only</th>
<th>❏ Triaxial Stress</th>
</tr>
</thead>
</table>

### Max confining pressure:

### Max axial pressure:

### No. of pressure taps:

### Upstream flow system

### Fluids to be injected:

### Max injection pressure:

### Flow rate:

Max: __________  Min: __________

### No. of accumulators:

### Accumulator volume:

### Wetted materials:

<table>
<thead>
<tr>
<th>❏ Stainless steel</th>
<th>❏ Hastelloy C 276</th>
</tr>
</thead>
</table>

### Test temperature:

Max: __________  Typical: __________

### Differential pressure module(s):

### Sample permeability

Max: __________  Min: __________  Typical: __________

### Back pressure control system

<table>
<thead>
<tr>
<th>❏ VPA</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>❏ Dome-loaded BPR with electronic back pressure control</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>❏ Coriolis mass flow meter</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>❏ Other:</th>
</tr>
</thead>
</table>

### DAQ and test control

<table>
<thead>
<tr>
<th>❏ Automated data acquisition system</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>❏ Automated test configuration and control</th>
</tr>
</thead>
</table>