

SCRAMS® (Surface-Controlled Reservoir Analysis and Management System)

Remotely Control the Wellbore and Obtain Real-Time Pressure/Temperature Data from Each Zone

WellDynamics' Surface Controlled Reservoir Analysis and Management System (SCRAMS®) is a fully integrated control and data acquisition system that allows operators to remotely control the wellbore and obtain real-time pressure/temperature data for each reservoir interval. The data feedback and accurate flow control capability allows the operator to optimize reservoir performance and enhance reservoir management.

The SCRAMS system is ideal for onshore, platform, and subsea applications.

Benefits

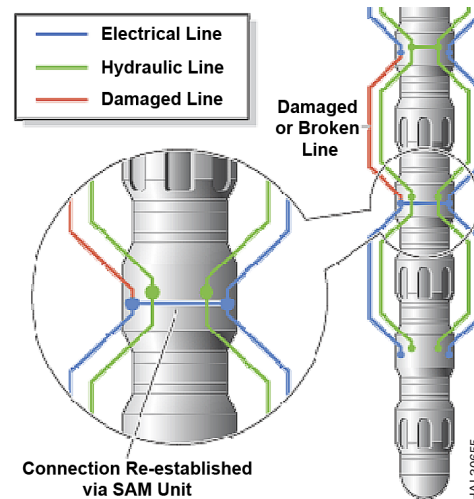
- Optimize reservoir performance by controlling multiple reservoirs without intervention
- Enhance reservoir management through real-time data acquisition
- Remotely control the wellbore
- Obtain real-time pressure/temperature data for each reservoir interval
- Steer around faults for continued functionality, using full redundancy capability
- Control multiple intervals from only one of the two electro-hydraulic flatpacks through multi-drop functionality

Features

- Can be used to control WellDynamics infinitely variable hydraulic flow control valves
- Can be used for land, sea or subsea applications
- Interface capabilities with multiple subsea control vendors
- Infinitely variable control valve positioning
- Flow estimation derived from fundamental metrology

How the SCRAMS® System Works

The link from the control equipment located outside the well to the downhole tools includes redundant hydraulic and electrical (I-wire) control lines enclosed in a flatpack. The hydraulic control line provides the hydraulic power to a sensor actuation module (SAM™), which uses solenoid valves, then distributes this hydraulic force to each side of the ICV piston. The I-wire allows transmission of electric power and communication signals from the well controller to all of the downhole tools by means of a multi-drop telemetry system.



SCRAMS® System

To further enhance the downhole system survivability, the redundant electric and hydraulic network is segmented using the SegNet™ communications protocol.

SCRAMS® Components

Infinitely Variable Interval Control Valve (IV-ICV™)

Each IV-ICV™ is coupled to a SAM tool in a SCRAMS completion, and is used to control the flow into or out of the reservoir interval. The SAM tool manipulates the IV-ICV choke using a position sensor that is magnetically coupled to the IV-ICV actuator. This process allows the incremental positioning of the choke from the closed to the fully open positions, enabling high resolution of flow control downhole.

Sensor Actuation Module (SAM™) Tool

The SAM tool provides the control and data acquisition functionality for the SCRAMS system. It contains redundant electronics, each separately connected to individual flatpacks, a hydraulic manifold to distribute hydraulic power, and sensors for pressure/temperature measurement.

The SAM tool is the active component of the SegNet infrastructure. Incoming electrical and hydraulic buses are terminated into the SAM tool and exit to provide communication to other SAM tools further down the completion string. Solenoid valves and electrical switches incorporated in the SAM tool allow isolation of any potentially faulty sections of the network connecting the next tool in the completion.

SegNet™ Communications

If a failure, either electric or hydraulic, develops in any section of the network between surface and the downhole tools, the SegNet communications protocol provides the ability to steer around the failure, thereby retaining full functionality of the complete SmartWell® completion system.

HF-1 Zonal Isolation Packer

WellDynamics' HF-1 Packer is a single string, retrievable, high performance cased-hole packer. The packers are normally control line set via the SAM tool in a SCRAMS completion.

Flatpack

The SCRAMS flatpack consists of one hydraulic line and one electric line, with mechanical "bumper bar" protection. Two flatpacks are run in a SCRAMS completion for system redundancy. The electric line, or I-wire, provides the conduit for electrical power and communication between the SAM tool and the surface.

The hydraulic control lines carry hydraulic fluid under pressure to provide the motive force necessary to manipulate and control the IV-ICV. Steel cables (bumper bars) are run through the length of the flatpack to provide mechanical protection against crushing, and to anchor the flatpack at control line terminations.

SmartWell Master™ Software Application

SmartWell Master™ application is the supervisory application for WellDynamics' Digital Infrastructure product line. Designed to provide a central point of control, the SmartWell Master application integrates field control system peer connectivity with the engineer's computer control and data acquisition activities.

For more information on any of the details featured here, please email us at welldynamics@halliburton.com.

© 2009 Halliburton. All rights reserved. Sales of Halliburton products and services will be in accord solely with the terms and conditions contained in the contract between Halliburton and the customer that is applicable to the sale. H06976 8/09

www.halliburton.com