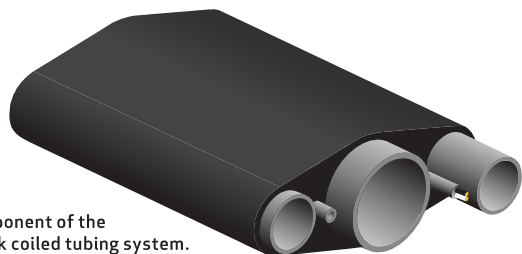


TOOLS OF THE TRADE

A LOOK AT NEW TECHNOLOGIES

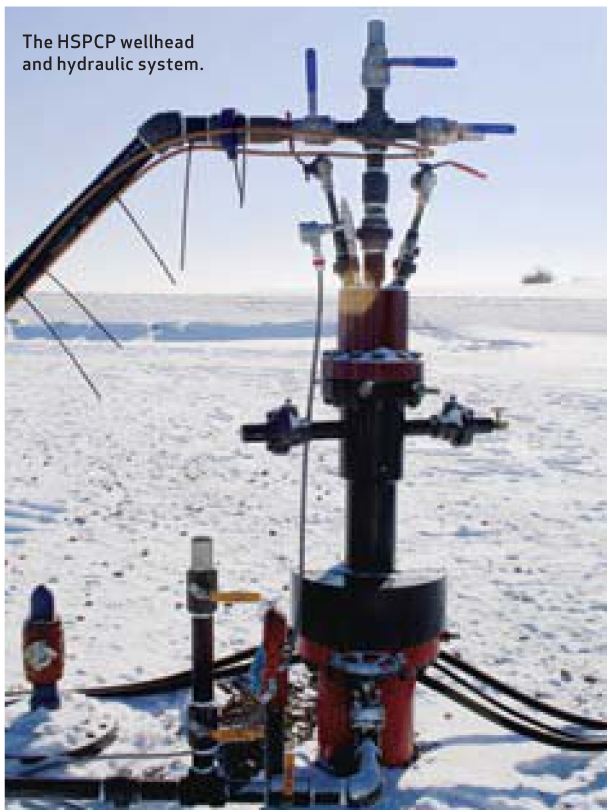


A component of the FlatPak coiled tubing system.

Installing a new hydraulic PCP system.



The HSPCP wellhead and hydraulic system.



Hydraulic Progressive Cavity Pump System

Why did you develop the Hydraulic Progressive Cavity Pump System?

We developed this technology in response to an industry request to eliminate conventional rods and tubing and the surface drive head when functioning a PCP [progressive cavity pump] due to the numerous interventions operators have experienced from the wear and tear associated with this mechanical drive system. With more and more horizontal wells now being drilled both to recover heavy and light crude oil, our system is able to convey the progressive cavity pump "around the corner" in the heel of a horizontal well without the typical mechanical wear while increasing the production rate and amount of recoverable oil from the reservoir by drawing the reservoir pressure down to its minimum.

What's unique about the system?

This system is unique as it is conveyed via a FlatPak coiled tubing system with the PCP actuated hydraulically. Incorporated in the umbilical used to convey and function our downhole driver are:

- Two coiled tubing lines to complete the hydraulic circuit to drive the downhole rotary motor;
- One coiled tubing line to receive production fluids to surface;
- A capillary to inject chemical or viscosity reducer to help heavy oil flow to surface;
- Electric conductors used in conjunction with downhole sensors and surface memory or SCADA to record pump intake and discharge pressures and temperature.

The FlatPak is connected to the hydraulic driver (containing a motor, seal assembly and wiper assembly), which in turn is connected the pump rotor. A short rod string is incorporated to remove any eccentric motion.

Is it field-proven?

We commenced production from two cold heavy oil wells located in Lloydminster on Feb. 25, 2011, and the wells quickly stabilized. Discharge pressures are operating at 1200 and 2000 psi [pounds per square inch], which is not tasking the pump good to 3,000 psi on a continuous basis. We have completed comprehensive testing of our system in our shop offering us data used in concert with the surface flow meter and pressure gauges to calculate torque. We estimate that the two systems currently deployed require under 200 foot-pounds of torque with the driver capable of delivering about 700 foot-pounds on a continuous basis.

In summary, we are hydraulically moving a typical Lloydminster volume of very heavy oil up a 1.5-inch ID tubular from 85 degrees in the heel of horizontal wells. We are monitoring pressure and temperature with the digital sensors and surface recorders so that we can optimize production without pump off. We also incorporate a capillary tube into the FlatPak enabling the operator to inject friction reducers, de-waxing, descaling or sand suspension chemicals as he sees fit. We are now designing the second generation of our HSPCP system that will get us into smaller casing environments. In addition, we have designed a thru-tubing solution should the operator find this beneficial.

Answered by Scott Kiser, Business Development, CJS Coiled Tubing Supply Ltd.