Concepts NREC

The Experts in Turbomachinery

Case Study

Downhole Gas Separation and Injection Process Powered by a Turbo Expander

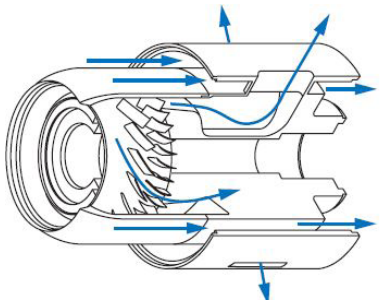
This article is an abstract of a paper presented at the 1998 SPE Annual Technical Conference and Exhibition held in New Orleans, LA. For a copy of the complete paper, titled Downhole Gas Separation and Injection Powered by a Downhole Turbo Expander, please contact the Society of Petroleum Engineers, P.O. Box 833836, Richardson, TX 75083-3836.

A downhole gas compressor and turbine expander are being developed to inject excess gas into the North Slope oil fields. These fields, as well as some oil and condensate fields elsewhere in the world, are limited in liquid hydrocarbon production and usually require costly surface facilities to process, compress, and reinject the produced gas.

A better method may be the Subsurface Process and Reinjection Compressor (SPARC) concept that uses excess production pressure (energy that is usually wasted across a choke) to generate power through a downhole turbo expander that runs a downhole gas compressor to reinject a portion of the gas stream. The primary advantage of the SPARC is that it can provide additional gas injection capacities at a fraction of the capital cost of traditional surface equipment.

Two basic machines are now being developed with one operating in parallel flow and the other in series flow. The parallel-flow machine maintains the highest pressure possible throughout in order to inject the maximum amount of gas. A separator divides the production into two streams. The first stream consists of liquids and a portion of the gas which is used for power generation. The second stream, consisting of dry gas, is compressed and injected into a reservoir that the wellbore penetrates.

In the series-flow machine, the entire liquid and gas stream is passed through a turbo expander, then a portion of the gas is separated for reinjection. The series machine allows for maximum cooling and pressure reduction to recover a significant fraction of the condensate from the gas stream prior to gas



separation and reinjection. The series machine reinjects less gas than the parallel machine, but it will recover a higher percentage of the condensate in the gas produced and, therefore, be the more ec nomical to use in a condensate reservoir.

CORPORATE HEADQUARTERS
217 Billings Farm Road
White River Junction, VT 05001-9486 USA
Phone (802) 296-2321 • Fax (802) 296-2325
E-mail: sales@ConceptsNREC.com
Web: www.ConceptsNREC.com