

SEMI-ACTIVE COMPRESSOR VALVE DEVELOPMENT AND TESTING

By

Klaus Brun, Ph.D., Southwest Research Institute®
John P. Platt, BP Exploration & Production Technology

ABSTRACT

A novel semi-active reciprocating compressor valve was designed, fabricated, and tested to address performance limits of current technology compressor valves. This valve's concept is based on a conventional plate valve design but replaces the valve springs with an electromagnetic coil that senses position and provides an opposing force prior to the plate's impact (i.e., although actively controlling the motion of the plate, this valve does not require pressure sensors or shaft encoders for control). By reducing the valve plate's opening and closing impact velocities, one can effectively design an infinite fatigue life plate valve.

Two semi-active valve models were developed, built, and tested over the last 18 months: a benchscale model and a prototype model. Both valves were mounted in a 250 HP reciprocating compressor and tested over a wide range of operating conditions. The benchscale semi-active valve tests demonstrated the feasibility of the concept, while the subsequent prototype tests provided endurance and performance optimization. The following list shows the valves' principal advantages:

- Plate opening/closing impact velocities can be reduced to provide a soft plate landing.
- The valve automatically self-regulates to any compressor speed and operating condition without operator input.
- The valve reverts to passive operation and continues to function when the control mechanism fails or is disabled.

Additional endurance testing is ongoing to quantify the service life of the prototype valve and to optimize the valve control performance. Once this endurance testing is completed, the valve will be installed in an actual compression station for field trials.

Presenting Author Contact Information:

Dr. Klaus Brun
6220 Culebra Road
PO Drawer 28510
San Antonio, Tx 78238-5166
e-mail: kbrun@swri.org
Tel: 210 522 5449