

Economics of Wellhead Compression

N. Van der Kolk, A. Kauffeld
Siemens AG, Assen, Niederlande

Abstract

Many natural gas fields in Western Europe are mature and a large portion of the gas wells experience liquid loading. Wellhead compression has proven to be a very effective deliquification technique; by lowering the wellhead pressure, compression can substantially increase production rate and reserves.

But more than ever, operators considering wellhead compression have to critically evaluate its economics. After equipment and installation costs, energy consumption represents the largest portion of the total cost of ownership. Three steps are important for the economics of wellhead compression:

1. Selecting the proper compressor type,
2. Choosing the right amount of compression power and capacity,
3. Energy-efficient control and operation.

The first part of the presentation compares different compressor types that may be considered for wellhead compression. It is shown that in most cases an oil-injected screw compressor is the best fit with regard to operability, reliability and energy efficiency.

The second part presents a case study that demonstrates how an economical evaluation answers the question how much compression power/capacity should be installed at a particular gas well or manifold.

The last part explains how operational costs can be reduced by energy-efficient control and operation. The part-load efficiency of an oil-injected screw compressor is significantly improved by combining slide valve capacity control with speed control, using a variable speed drive. Further energy optimization is achieved by online evaluation of the actual well performance characteristics, as well as the compressor performance. By combining this information, the optimum operating point with respect to energy consumption is determined, while assuring that the gas rate is maintained above the critical velocity to keep the well deliquified.