

SCREW COMPRESSORS

BOOSTING FUEL GAS IN TURBINES

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Fuel supply pressures are often unpredictable in today's natural gas-fired plants. These plants therefore require flexible booster compressors that can maintain a constant fuel gas inlet pressure as specified by turbine OEMs.

Screw-type compressors provide a flexible solution for fuel gas boosting. They are reliable in continuous and intermittent operation. State-of-the-art condition monitoring systems can help to enhance their performance. The following case study helps to illustrate this.

'Blood pumps'

The Mountainview combined cycle plant in Redlands, CA, started commercial operation in 2005. It was the first new major power plant built in the Los Angeles basin in 30 years. The plant has two 527 MW blocks — each featuring two GE 7FA gas turbines and one steam turbine.

The fuel — pipeline natural gas — is supplied by a 13-mile dedicated 24-inch pipeline from Etiwanda at 486 psig, 34,185 MMSCF/year and around 311,250 lb/hr. Fuel gas boosting is achieved by five screw compressors — Kobelco model KS31 SEH (Figure 1). One compressor is installed as a spare, in standby mode.

The GE 7FA CTGs operate in base load configuration, with the steam turbines in sliding pressure mode. Each of the fuel gas compressors is equipped with a slide valve arrangement, allowing for automatic capacity turndown to design flow at the constant discharge pressure required by the gas turbine.

The delivery pressure of the pipeline gas has been "unusually variable, and consistently lower than expected," says Ian Cuthbertson, Mountainview's Plant Manager. Four of the five Kobelco compressors operate almost continuously to provide a reliable fuel gas supply pressure to the gas turbines, particularly during peak summer months (Figure 3).

The fuel gas boosting compressors are critical for the continuous operation of Mountainview turbines. Therefore, early warning and predictive monitoring of the equipment are important.

Since startup, there has been one unscheduled outage — in 2006. This was due to a failure on the electric motor driver of one of the compressors. Repairs were handled by



Figure 1: Five Kobelco screw compressors provide fuel gas boosting in Mountainview



Figure 2: Wireless condition monitoring provides early warning of booster packages

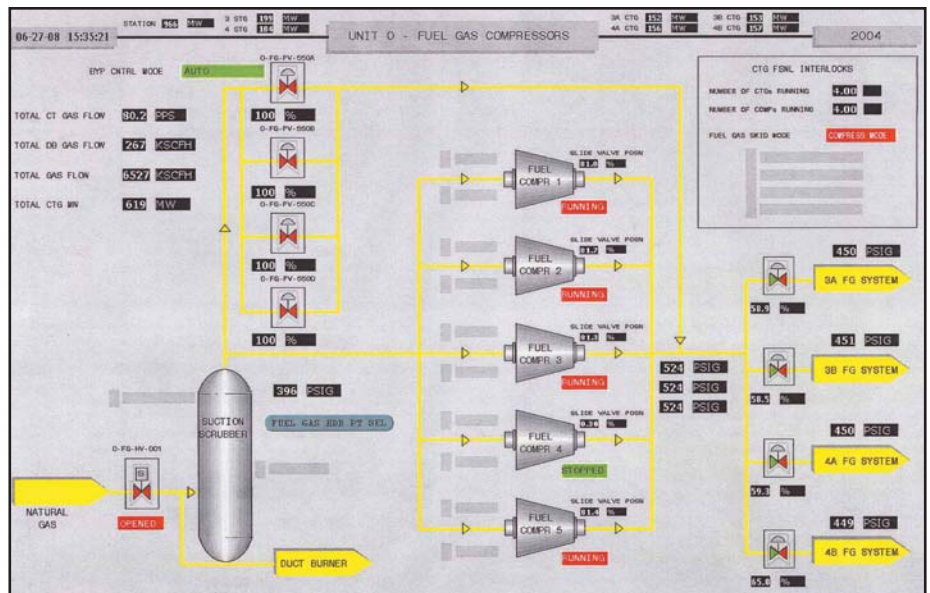


Figure 3: On a recent summer day, four of the five screw compressors were working to provide constant fuel gas pressure to the turbines

the contractor directly with the motor vendor.

After repair, Mountainview personnel decided to add predictive maintenance instrumentation to motor bearings to remotely monitor and transmit motor bearing temperatures and vibration levels (Figure 2). These wireless devices were able to accommodate the monitoring of additional compressor health parameters, such as bearing temperatures.

The parameters are all fed to a single wireless remote transmitter mounted on top of the compressor. The condition monitoring system provides continuous online monitoring, capable of alerting operators to alarm conditions via e-mail or telephone. These critical health parameters are also accessible via internet. Future plans include upgrading the system to add additional health parameters.

The API specification that governs Kobelco's screw-type fuel gas compressors is API 619, 4th Edition, for rotary, positive displacement compressors. The compres-

sors have average reliability figures of over 96% — better than or equal to centrifugal compressors. The reliability of the compressor packages in Mountainview was 100% in 2007 and in January - June 2008. **TI**

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