Leak Detection and Location for KOC's Gas & Condensate Network

Kuwait Oil Company KOC owns and operates multiple oilfields in Kuwait. KOC is primarily responsible for the operation and production as well as the exploration and development of Kuwait's oil assets. These assets include fields in the northern, western and southern regions of the country. Gas is a by-product of oil production as Kuwait currently has no pure gas reserves.

Twelve strategic pipelines transport gas and condensate from the oil treatment plants via booster stations to customers and subsequent processing plants.

The monitoring of these pipelines will be carried out by the new Gas Management Information System (GMIS) at the Gas Management Centre (GMC) in Burgan.

Objectives

The GMIS is focused at improving two areas of operational performance and efficiency:

- The efficient management of the Gas & Condensate Network operations through automation of the overall gas transportation, distribution and accounting.
- The safety and efficiency of detecting leaks and risk mitigation within the overall network on the 12 strategic pipelines.

The project aims to improve the management of gas assets from an operations and safety point of view in order to meet supply & demand requirements with minimal flaring.

PSI

The GMIS will play a key role in achieving these objectives by allowing operational staff and management at KOC's Gas Management Centre access to information in a timely manner in order to aid with decision making and day-to-day operations.

Implementation

PSI was awarded the contract to implement the Pipeline Leak Detection System (PLDS) PSI*Pipelines*.

The main methods chosen for leak detection and location were Model Compensated Mass Balance and Pressure Drop Analysis.

PSI*Pipelines* is responsible for the following tasks:

- Acquisition of process data from ABB's control system via OPC
- Simulation of the pipelines' hydraulic conditions
- Look ahead model (LAM)
- Predictive model / forecasting
- Leak detection
- Leak location
- Detecting malfunctions by means of instrument analysis
- Calculation of pipeline friction, leading to recommendations for pigging
- Detection of upcoming block line conditions in gas pipelines due to condensate slugs
- Pig/scraper tracking
- Transmission of leak alarms to the control system via OPC
- Visualisation of mass balances on the workstations in the control room
- Training system

System Configuration

Three IBM computer servers with Windows 2003 Server operating system were chosen to run the following functional groups:

- Real time online simulation
- Predictive simulation
- Training simulation

These computer servers are connected to the servers of the control system via Local Area Network.

PSI's Scope of Supply

- Functional specification of the system
- Leak sensitivity study for both pipeline systems, including recommendations regarding instrumentation
- Specification and implementation of the interface to ABB's control system
- Specification of all hardware components
- Installation and commissioning of the leak detection system
- Collaboration with KOC during the site acceptance tests

PSI Aktiengesellschaft für Produkte und Systeme der Informationstechnologie
Dircksenstraße 42-44
10 178 Berlin
Tel: +49 30 2801 - 0
Fax +49 30 2801 - 1000
http://www.psi.de

Contact
PSI*Energy* Oil & Gas
Dr. Martin Bürgel
Tel: +49 30 2801 - 1504
Fax +49 30 2801 - 1011
E-mail mbuergel@psi.de
http://www.psioilandgas.com