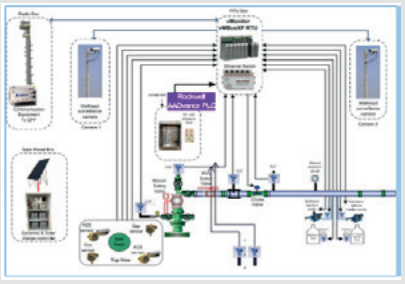
SENSIA
Rockwell Automation + SLB

+ CASE STUDY

WELLS SIL (Safety Integrity Level) 2 CONVERSION for a Middle East NOC

Remote monitoring, control, wellhead hydraulic control panel and pressure, temperature and safety instrumentations for 44 wells



Key Highlights

+ AVALON Software early generation
+ Well instrumentation: Pressure, Temperature, H2S and Combustible Gas Detector
+ Hydraulic Wellhead Control Panel with electric pump (Hybrid)
+ SIL2 Wellhead Safety programmed
+ Corrosion monitoring
+ Automated choke valve supply and control
+ Wireless video surveillance
+ Data Acquisition

Challenges

+ Customer wished to develop a template of a solution to be integrated with Production Data Management Systems, Workflow Software and Reservoir Optimization tools
+ High pressure condensate and wet gas wells, with presence of H2S and Combustible Gas Detector
+ Remote Location
+ Remote Control of choke sizes and shutdown on demand required
+ Safety study requires SIL2
+ Unavailability of power from utility

The design and engineering of an Integrated Supervisory Control and Data Acquisition (SCADA) system for wellheads is crucial for efficient and safe operation in the oil and gas industry.

The SCADA system acts as a centralized monitoring and control platform, allowing operators to remotely access and manage various components of the wellheads. This includes monitoring pressure and temperature, as well as controlling valves and other equipment.

To enhance automation and flexibility, the wellheads are equipped with remote control capabilities for automated production choke size adjustment. This is achieved using WIMAX Radios, which provide reliable wireless communication over long distances. Operators can remotely modify the choke size to optimize production rates and ensure efficient resource extraction.

Safety is of utmost importance in such operations. Therefore, the SCADA system is integrated with a Process Safety Shutdown mechanism, working in conjunction with a hydraulic control panel. The system is SIL (Safety Integrity Level) Rated 2, adhering to stringent safety standards to prevent accidents and protect personnel and equipment. AADvance stood out as the preferred safety system, primarily for its notable advantage of demanding low IO density while offering a scalable and adaptable architecture.

As a part of safety measures, the wellheads are equipped with advanced Safety Gas Sensors to detect harmful gases such as H2S (hydrogen sulfide) and Combustible Gas Detector. These sensors continuously monitor the air quality and trigger appropriate actions if gas concentrations reach hazardous levels, ensuring a safe working environment.

In addition to automated safety shutdowns, operators can initiate Remote Operational Shutdowns on demand. This feature grants them the ability to halt operations quickly in case of emergencies or unforeseen circumstances, mitigating potential risks and damages.

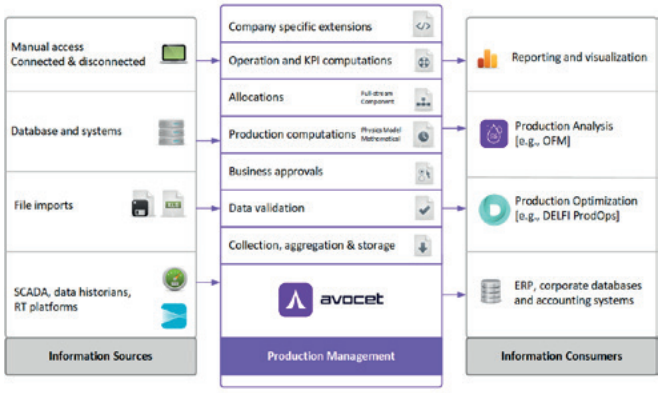
Security is also a priority for wellhead facilities. The system includes an Intrusion Detection and Video Surveillance feature, which relies on Closed-Circuit Television (CCTV) cameras equipped with embedded analytics. This setup enables real-time monitoring of the premises and the automatic detection of suspicious activities. In the event of any intrusion, the system activates a local alarm annunciation system to alert nearby personnel.

Efficient chemical injection is essential for wellhead maintenance and production optimization. The SCADA system is designed to monitor and control the rates and/or tank levels of chemical injection systems. This ensures that the right amount of chemicals is injected into the wellhead to maintain operational efficiency and prevent corrosion or scaling issues.

The SCADA system is further integrated in real time with production optimization software such as **AVOCET** and PIPESIM, among others. This integration allows for seamless data exchange and analysis, enabling operators to make data-driven decisions and optimize wellhead production and resource management.

Considering the remote locations of wellhead facilities, a custom Solar System with five (5) days autonomy is implemented to ensure a stable power supply. This solar power setup reduces dependency on traditional energy sources and provides a sustainable and reliable energy solution for the operation of the SCADA system and other essential equipment at the wellhead site.

The five-day autonomy ensures that even during periods of low sunlight, the system can continue functioning without interruptions. Overall, this comprehensive and advanced SCADA system design enhances operational efficiency, safety, and security while ensuring optimal resource extraction from the wellheads.



Result

The System help client to Reduced deferred production by avoiding scale formation in pipeline because of continued choke control size based on input from **AVOCET** & PIPESIM workflows and modeling, Reduced FEED Costs, **Reduced project deployment time 25%, Reduced theft risk and Reduced Safety Risk**.