Case Study – Midstream Gas Pipeline

24/7 Enhanced, Automated Vigilance for Critical Infrastructure Operations

AISight® for SCADA provides control room operators with real-time identification of abnormal operating conditions – before critical alarm data points are met

Challenge

Pipelines, oil and gas production operations, process facilities, and other related businesses are part of what the United States Department of Transportation, Department of Homeland Security, and Transportation Security Administration categorize as critical infrastructure. As such, these energy production and transmission organizations use SCADA (Supervisory Control and Data Acquisition) systems to operate their facilities safely and security.

SCADA systems are rules-based environments. Key data points for pressures, temperature, levels, and other measurements have alarm set-points for high and low conditions, which are triggered when the data stream from a sensor crosses a threshold. When that happens, control room personnel receive an alarm for investigation.

While normal operating conditions can be reviewed at any time, doing so is typically a manual process, and trend analysis rarely matches current conditions. The only way operators can notice something unexpected within a sensor’s data stream is to have someone watching that data on a 24/7 basis – clearly not practical in a plant where thousands of critical data sensors may be in operation.

The customer recognized that identifying abnormal behavior across one or more data points in real-time would provide valuable insight into critical equipment operations, as well as the overall health of the plant. This information might help avoid shutdowns by recognizing potential problems before alarm points were reached.

Fast Facts

- Customer operates an interstate midstream pipeline system encompassing wellhead operations on through to industrial and residential natural gas delivery
- Operations center was staffed 24/7 using a state-of-the-art SCADA system and an experienced staff
- Customer realized that many useful, even critical, data points might indicate trends meriting investigation long before alarm conditions were met, but staff could only monitor a small fraction of this data at any given point in time
- BRS Labs’ AISight for SCADA was deployed in a beta program to introduce real-time sensor monitoring and multi-sensor correlation across massive numbers of sensors without impacting active production systems
- Customer recognized significant value from AISight’s ability to deliver broader, deeper perspectives on current operations via automated behavioral analytics

The rules-based nature of SCADA, however, meant that staff, limited by what any individual operator might be observing at that specific moment in time, focused on alarms rather than current operating conditions. Even worse, not all alarms are of equal priority. Without insight into the conditions that caused an alarm, staff had no way of ranking severity without losing time for research and investigation when rapid response might be critically necessary.
Solution
The customer turned to BRS Labs and GlobaLogix to deploy AISight for SCADA to enhance their existing SCADA system with real-time situational awareness. BRS Labs has long experience in behavioral recognition analytics for massive amounts of sensor data. This technology, previously applied to self-learning video analytics, was extended specifically to work within SCADA deployments. GlobaLogix is a controls and automation engineering firm serving the upstream and midstream oil and gas industry, with wide recognition for expertise in SCADA.

Working together, the two companies integrated AISight into the customer’s existing SCADA system through an add-on module that constantly reviewed all polled operating condition data points and delivered advisory alerts to SCADA control room operators. AISight uses artificial intelligence to learn normal behavior across tens of thousands of data streams, then alerts for unexpected patterns within that data. Applied to the customer’s SCADA deployment, AISight monitored current conditions within and across data points throughout the facility.

These intuitive alerts for abnormal data patterns were not used as a replacement for the SCADA system's alarm management system. Instead, they supplemented those efforts by helping operators focus on unexpected situations before they became critical events. Operators gained the ability to see what was happening in real-time in a manner not possible before, without having to add staff or modify how personnel used the existing SCADA interface.

Results
One typical result was the discovery of changes in valve temperature in a compressor that indicated an imminent failure and system shut down. Other useful results included tank levels that dropped while production continued to flow into the tank battery, indicating a rupture or possible ongoing theft of valuable condensate.

At the end of the testing period, AISight’s performance indicated multiple areas for enhanced operational awareness, including:

- Immediate insight into unexpected patterns of customer gas usage by customers, which enables rapid reactions by gas control personnel for nominating daily contracts and system balances
- Faster gas control and dispatch response for leak detection
- Early warning preventive maintenance indicators for major items such as compressors and pumps
- Efficient dispatch of operating personnel based on indications of impending problems, rather than “after-the-fact” reactions to alarms
- Proactive safety actions for leaks or other serious residential gas usage events
- Proactive gas supply management based upon fluctuations in industrial gas usage
- Safer, more profitable pipeline operations

Overall, the customer is very happy with the initial implementation of AISight, with one senior manager describing it as “like having 50 assistants helping me watch what’s going on in the system all the time.”

About BRS Labs
BRS Labs builds self-learning behavioral recognition software for enhanced safety, security, and operational efficiency. These highly automated solutions dramatically improve situational awareness and incident response across complex physical environments. Patented artificial intelligence technology accurately identifies threats in real time; deploys quickly as on-premises software, Software-as-a-Service (SaaS), or through the Cloud; and is inexpensive to operate and maintain. Customers around the world use BRS Labs to react sooner to unfolding safety, security, and operational management situations and to deploy staff more efficiently. Government agencies and businesses of all sizes rely on BRS Labs to protect people, assets, facilities, and borders. BRS Labs is headquartered in Houston, with offices in Washington DC, London, Sao Paulo, and Barcelona.