



ADDING VALUE WITH ANALYTICS

Andy Young, Pioneer Energy, USA, explains how data analytics software allows operators to evaluate performance at remote well sites.

The oil and gas industry, like many others, is collecting and storing ever larger volumes of data. Although there is value in this data, it is often difficult to unearth using conventional analysis tools such as spreadsheets. To address this issue, new data analytics software platforms are being introduced specifically to deal with time-series data.

Because these new data analytics software platforms are dedicated to just one specific function, analysing time-series data, they are much easier to use than a general-purpose tool such as a spreadsheet. In the hands of a process expert, usually an engineer, data analytics software can quickly yield answers to questions regarding operations – leading to improvements in safety, uptime and throughput.

Pioneer Energy in Lakewood, Colorado is a service provider and original equipment manufacturer solving gas processing challenges in the oilfield with a range of standard gas capture and processing units for tank vapours and flare gas.

Pioneer Energy's VaporCatcher™ line of units captures hydrocarbon vapours from crude oil tank batteries and extracts natural gas liquids (NGLs) at high yields, instead of sending these valuable commodities to combustion or venting to atmosphere. This significantly reduces emissions, meets EPA Quad O compliance standards and provides a significant economic return.

The company's FlareCatcher™ line of equipment provides flare gas capture and processing at the well site, producing NGLs and pipeline quality lean methane, and enabling producers to achieve regulatory compliance.

Oil and gas fields in North Dakota, Montana and Colorado use these systems at production well sites to capture methane and natural gas liquid streams. Pioneer Energy provides a turnkey solution, operating and monitoring these geographically dispersed units from its headquarters in Colorado. The company's operations and design teams monitor the equipment and analyse the results to deliver continuous improvement.

The FlareCatcher is powered with a natural gas generator, which is inside the white enclosure on the front of the trailer as shown in Figure 1. The fuel gas for this generator is provided by any of the refined energy products made by the system, and this usage represents only about 5% of the total energy of the gas processed by the equipment.

The system has auxiliary (backup) batteries which are charged with a conventional battery tender powered by the primary generator or a solar panel. The auxiliary power system is required to keep communications alive during periods when the system is not running due to maintenance, a component level failure, or insufficient gas flow from the site. Once the shutdown condition

has been remedied, having communications available with headquarters allows remote startup.

Acquiring data from afar

Pioneer currently has systems installed in the Western US, but future sites could be located onshore or offshore anywhere in the world with cellular or satellite connectivity. Alternatively, a local radio network could be installed to get the data to a network hub.

Well site data from the systems is sent to local data centres. This is a critical element of Pioneer's modular architecture as it leverages specialised resources. Data centres have extensive redundancies built into their power and networking services, absolutely required for operating critical hardware remotely. Pioneer uses one data centre in Denver and one in Dallas, and is investigating virtualisation to add dynamic scaling and load balancing to field data gathering.

Currently, all analogue data is being transmitted at one-second intervals. Discrete data is transmitted as it changes.

While the company had data coming in from field sites to the data centres, they had no sophisticated data analysis tools. If engineers found themselves with some free time, they could manually load historical data into an Excel spreadsheet and calculate a few basic metrics. But Excel is not suitable for calculations of reasonable complexity, so much of the data gathered was not being utilised to the greatest extent possible. The company needed to find a way to better analyse data from its far flung operations.

Adding analysis

After reviewing various data analytics software packages, Pioneer selected Seeq's visual data analytics application because it most closely fit the software the company had envisioned. It had all the required components: a graph database, time series optimisation and a clean browser-based interface – as well as advanced data analytics and information sharing capabilities.

The software enabled Pioneer to optimise the data stream. Engineers are able to define simple computations to be performed at the edge to determine what data needs to be streamed elsewhere for analysis, and what data can be archived locally at the sites.

Seeq is currently being used to analyse and understand historical data, and to generate and define new rules for operating parameters (Figure 2). Applications are manifold. In a continuous improvement cycle, all data has potential value if it can be unlocked and leveraged. Seeq provides an environment for experimentation and learning, and its visual feedback is the appropriate way for engineers to analyse complex data in a reasonable amount of time.

For example, key components of Pioneer's technologies are advanced refrigeration system designs that can be very sensitive to changing operational conditions. Seeq has allowed Pioneer to isolate these effects, identify their causes, and develop simple operational rules to extend the life of capital investment.

One of Pioneer's core value offerings is the ability to operate systems remotely. If software helps identify a problem with equipment in the field, corrective action can be taken quickly. For instance, Pioneer uses air-cooled cascade refrigeration systems. During hot days, discharge temperatures and pressures can rise to elevated levels, leading to hardware failure. Detecting this with advanced metrics and predictive analytics allows operators to intervene and turn down the system throughput until the condition has cleared.

All data from the well site is streamed to a centralised, secure data centre, where the Seeq server resides and accesses all field data. From there, the interface is made available via a web proxy server. Technicians and engineers can access the data anywhere

there is a network connection, including at the well site itself with a cellular hot spot.

Installation and startup

Two on-site training sessions were performed in addition to remote installation and code development help sessions.

Application engineers identified an unusual issue causing an installation failure. Pioneer had made Seeq accessible through a web proxy server, which involves multiple port forwarding and security rules. Due to the many operations tools running on the server, there was a port conflict. A quick live session identified the issue. Other than this issue, installation and startup proceeded as planned without a hitch.

Results

The single biggest outcome of the Seeq installation is improved operational intelligence. The simple to use yet powerful visualisation and analysis tools shed light on otherwise complex processes. At this point, Pioneer is looking to increase Seeq's uptake and adoption throughout the organisation as a key design and operations tool.

Conclusion

Analysing time-series data to improve operations is a goal for many companies in the oil and gas industry. Like many other firms, Pioneer Energy has long relied on spreadsheets for analysis, but found this tool cumbersome for the task.

In search of a better solution, the company investigated and found new data analytics software platforms specifically designed to analyse time-series data were now available. These platforms were investigated in depth, and the selected solution was found to significantly reduced the time required for analysis. ■



Figure 1. The FlareCatcher unit produces NGLs and pipeline quality methane from flare gas.

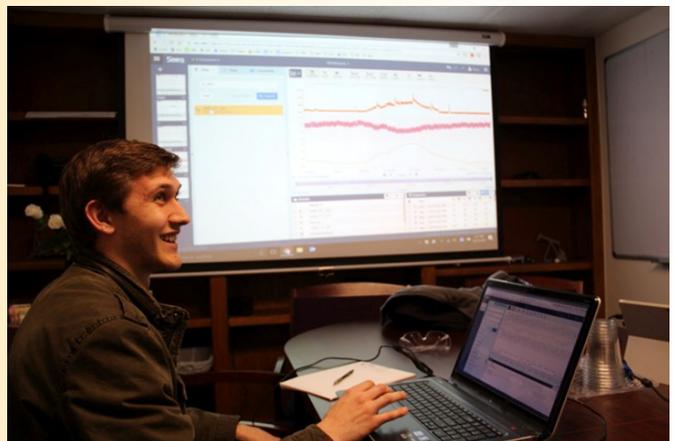


Figure 2. Pioneer Energy's engineers can monitor equipment at remote well sites with Seeq's data analytics software, optimising the data stream at the edge to focus on the most relevant information.