

Leveraging Remote Monitoring to Achieve Greener Field Operations

The energy industry's impact on the environment is a much-debated topic. Announcements about efforts to "go green" are often met with skepticism from outside the industry and resistance from within the industry. The resistance is typically bred by fears of high cost, or implementation difficulty.

However, basic steps can often produce efficiencies that directly benefit the bottom line. Changing how field personnel operate and integrating equipment into existing SCADA systems are two such efficiencies.

Evolving from the "Milk Run" Model

Most oil and gas fields are traditionally operated under what can be called a "milk run" model. Under this model, a field technician visits the sites in his field based on a schedule – a daily milk run. He begins his day at the field office and then heads out to visit his sites in rotation. If a compressor shuts down after his site visit, there is the potential for it to go unnoticed until the next scheduled visit. This can mean up to 24 hours of downtime, resulting in lost production and revenue.

For example, take a compressor at a site that has been set up with the discharge temperature shutdown at 300 F. A milk run field technician has his scheduled visit of this site near the end of his shift, around 4:00 p.m. A quick look at the compressor's panel shows a discharge temperature of 265° F, which is well below the alarm threshold. The technician moves on, and couldn't really be faulted for doing so, since there appears to be no issue with the unit.

What the milk run field technician doesn't know is that the discharge temperature at that location should only be 235° F, and that the temperature has been rising for the past few hours. This is where a dispatch mode of field operation has a clear advantage. Under the dispatch mode, this same compressor would be monitored constantly and in real time from a central control room. The control room operator assigned to monitor that area would be well aware of the increasing discharge temperature because of the trending capabilities of the SCADA system, and could dispatch a field technician as soon as he noticed the change. This technician would arrive at the scene with full knowledge of the issue before the unit ever goes down on a high temperature shut down. Most likely, he would have already surmised that the cause was a failing compressor valve, and he would have the right part with him to quickly remedy the situation.

This ability to proactively address field problems and avoid shutdowns saves hours of time and significant expenses. Dispatching technicians from a control center has a number of benefits for operators. In this example, dispatching the field technician while the temperature is still climbing and before the unit shuts down results in minimal overall downtime. The significant savings here is in the reduced miles driven each day, made possible by the dispatch mode of operations. Fewer miles driven has a direct positive impact environmentally, and a significant effect on safety statistics. Most reportable HSE incidents are vehicle and driver related; fewer hours behind the windshield means fewer reportable incidents.

Automating Field Operations to Address Environmental Concerns

In an industry and economy where down time can represent hundreds of thousands of dollars, being proactive instead of reactive has a huge impact on the bottom line, and a company's carbon footprint.

Remote monitoring that enables dispatched field operations contributes significantly to greener operations by way of reducing unnecessary site visits and road travel. This is especially important when working in environmentally sensitive areas, and considering impact to vegetation and disturbed wildlife.

In the Rocky Mountains, for example, many sites are under the regulatory oversight of the Bureau of Land Management (BLM). Reducing the amount of operating vehicle traffic on the service and lease roads leading to these sites is a key concern of the BLM. A dispatched mode of operation reduces this traffic significantly.

In one example, a major international energy and petrochemical company was conducting a large scale water project in Wyoming. Its production of gas in the Jonah field produced a significant amount of water and condensate that had to be either disposed of properly, or harvested as a product. To meet those requirements, the company sent trucks to pick up the water or condensate, creating unnecessary truck traffic. By programming remote PLCs to integrate with the company's SCADA system, the company automated the capture of water and condensate, piping it directly to disposal facilities. Automation in the field has reduced the company's impact on the area and helped it meet BLM requirements.

Emissions are also strictly regulated by the Environmental Protection Agency (EPA) and each state. If a company acquires a new field or adds wells to an existing field, their new equipment has to meet EPA and state requirements for NOX, CO and NMHC limits. Automating the monitoring of certain equipment can ensure that those measurements are integrated into SCADA systems for record keeping. If existing regulations are tightened, more accurate records and monitoring will be mandated, and remote capture of that data will be the only realistic way to maintain compliance with EPA standards.

Remote monitoring can also reduce the impact from spills and unplanned hydrocarbon releases. Safety is the primary driver behind the use of monitoring equipment and alarms, but a secondary driver is environmental concerns. In a field monitored by a SCADA system, operators can immediately dispatch staff to control the spill or release, significantly reducing environmental impact, and making cleanup easier and faster.

Electrical power management also contributes significantly to a greener operation, and towards the bottom line. Solar power hardware offers a reasonable alternative to grid-based power, and has become more cost-effective in recent years. Taking field locations off the grid and relying on clean, green solar energy reduces utility costs, and in many cases, brings more dependable, controlled service.

Electrically-driven rotating equipment should also be integrated into the SCADA system. When it is remotely-monitored, drive time and response time are reduced, but more importantly, equipment capacity and efficiency is optimized.

Optimizing the fuel efficiency and capacity of field rotating equipment

The average producing field is made up of wells that, over time, decline in pressure and volume. Rotating equipment (like gas compression or pumps) is sized for the well initially, but over time becomes under utilized and less fuel efficient.

Employing proactive compression monitoring allows operators to more efficiently use available compressor horsepower. Gas compressors are a major capital expense that may have a usable life of about 30 years. However, due to reduced volumes and suction pressures over time, the average well head compressor is only ideally suited for a specific location and application for less than three years before its cylinder sizes, staging and BHP make the compressor package no longer an ideal fit for the site. At that point, pressures drop and volumes decline and the field operator is left with underutilized equipment and wasted resources. If it is a leased piece of equipment, operators end up paying for horsepower they can not use.

Compressor efficiency can be a measure of the utilization of available horsepower. When the equipment is first installed, it should be fully utilized and at its most efficient. As well pressures drop and volumes decline unit efficiency drops as well.

Currently, most operators will check that a compressor unit is operating within acceptable ranges, but rarely will they report on a unit's BHP efficiency – a measure of the utilization of the available horsepower. This is where remote monitoring and SCADA come into play. There are advantages to reviewing equipment efficiency as part of the ongoing monitoring process. Monitoring allows operators to check the efficiency of their compression equipment and rotate or downsize operations to optimize the complete fleet of equipment over an entire region.

Maximizing equipment usage leads to improved fuel efficiency, ultimately resulting in greater throughput and gas sales. In most cases, the fuel savings realized by operating properly-sized equipment justifies the cost of an equipment change-out.

Going green while staying “in the black”

Many companies see dollar signs when they hear “green”, but in many cases, the savings realized by reducing field personnel site visits, and optimizing equipment efficiency, justifies the cost of the system. Identifying and repairing down equipment in hours rather than days multiplies those cost benefits. The altruistic case for going green can easily be supported by the benefits gained in terms of customer contracts, compliance with industry and government regulations, proactive monitoring and maintenance, equipment life extension and fuel cost savings.

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