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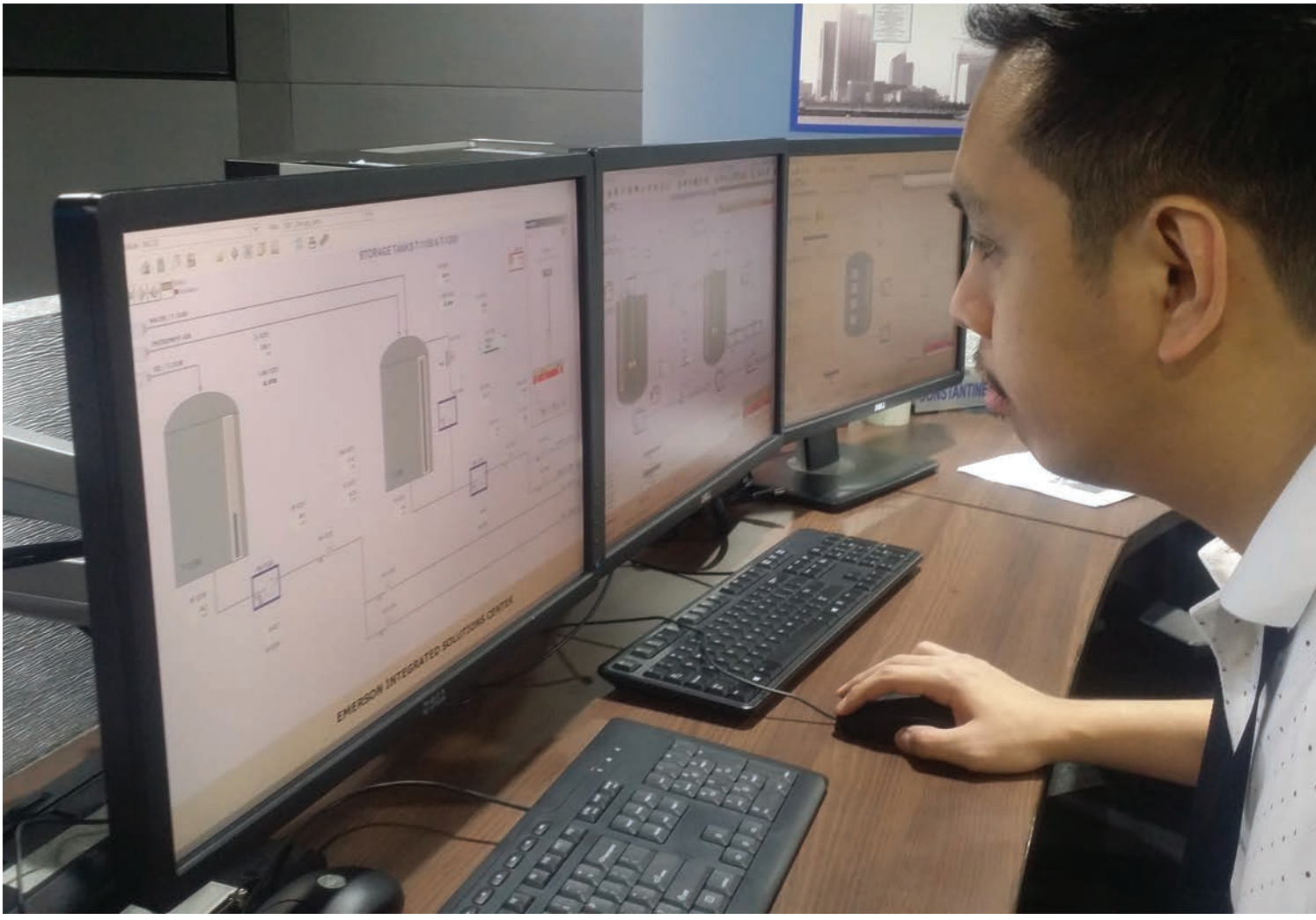
The Internet of oil



From the control room, the operator can see the field performance and diagnose production challenges.
Photos from Emerson.

Using wireless sensors to implement a pervasive sensing strategy is critical to improving production and becoming more competitive in these challenging times, explains Wally Baker from Emerson.

Today's oil and gas industry is seeing new production challenges, especially in light of the reduced oil price. For producers to be competitive, they have to find more ways to improve results and cut costs.

Production managers agree that without better information for improved measurement and control, they're unable to realize improved production and maintenance cost reductions.

What producers need is a steady stream of timely data from the production pads to be able to get a more holistic picture of the entire reservoir.

By making that information available to the right person at the right time, producers can see additional business improvements, including improved production rates, better water cuts and improved recovery rates.

To actually gain a competitive advantage, producers often need key additional data points from the field. More

and gas production

information gives an expanded view of the process known as a pervasive sensing strategy.

Increased sensing leads to more data, which once analyzed, leads to actionable information that can potentially solve multiple process challenges. With this information coming from across the entire reservoir, additional data can extensively enhance reservoir modeling, provide a substantial optimization edge and lead to significantly improved recovery rates.

This key information could include output flow rates from each well, tubing and casing pressures, water cut trends, and enhanced oil recovery (EOR) injection rates.

Challenges in big data management

Better information integration is easier said than done. Gathering traditional wellhead data can be manual and time consuming, and may require resources that are scarce. Trips to the field are expensive, increasing safety risks and adding to compliance costs.

Furthermore, inherited and legacy field equipment can often pose integration challenges. Plus, a high level of skill is required to interpret this data and turn it into actionable information that can lead to positive business results.

Producers have heard about the promise of the Industrial Internet of Things (IIoT), but when dealing with the challenges of hundreds or thousands of wells in remote, extreme environments, the collection of big data and the ultimate transfer of data into a centralized location for analytic and decision-making seem out of reach.

Automation has traditionally been costly both in equipment investment and in time, often taking 7-14 days to be installed. Within the last few years, however, technologies have been developed that allow deployment of automation equipment quickly and cost effectively, even in the harshest environments and without power.

Wireless automation

The technology ready for deployment right now that can address many operational challenges has been proven in use with more than five billion operating hours. This approach consists of adding wireless sensors in production areas, and then connecting these sensors to remote communication links to create

Monitoring well production using wireless pressure and temperature sensors.

an IIoT infrastructure.

The data from these sensors can be quickly incorporated into the IIoT infrastructure and then integrated into the reservoir modeling software. The results can then be converted into actionable data that can lead to operational improvements.

Since battery powered wireless sensors can be brought online in a fraction of the time of a traditional sensor, installing wireless sensing technologies is quick and low cost. Wireless solves the issue of sites without power since no wiring is required to power the transmitters.

In addition, a low power gateway can be connected to the communication links, typically without requiring any additional expansion of existing solar arrays and it will support up to 100 additional data points.

Installation is further eased since several of today's sensors are non intrusive. Wireless sensors can be connected directly to the field remote terminal units for well pad control and tie into remote communication links to tie the data into the cloud, public, private or hybrid, via secure communication connections.

Once the data is received, actionable information can be ascertained and securely delivered to the right people. In some instances, the most pressing need is to keep a well producing but often other information is needed.

One example, is compliance with health, safety, and environmental regulations. In these instances, the cost of noncompliance can be extremely high, ranging from severe fines to bad publicity to lost production.

In another example, by recording the well's tubing pressure and getting that production signature to the correct knowledgeable person, a minor choking back on the well increased production and eliminated process fluctuations.

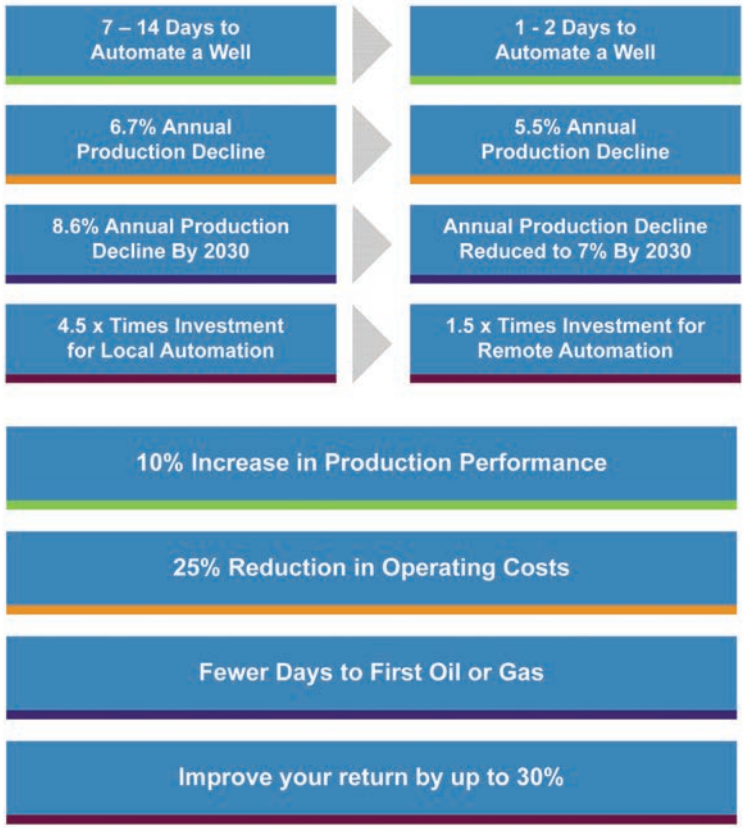
This also reduced the wear on the infrastructure, lowering the risks of equipment damage, due to its previous condition. Reducing the risk of damage to the well or pad equipment also reduces the possibility of deferred production. This in turn may avoid a costly well workover, which could be more than US$50,000.

In-line wireless pressure transmitters can deliver this critical information, but to get reliable readings these transmitters must be able to exhibit overpressure capabilities that withstand the rigors and pressure spikes that are seen in today's production environments.

These same transmitters also offer diagnostics to troubleshoot issues and pinpoint where and what the problem is, be it process or device issues. In addition, transmitters are optimized for ultra-low power electronics to enable up to 10 years of power module life, reducing maintenance requirements.

Likewise, additional information from the field brings significant business value, including immediately knowing additional parameters of well health casing pressures, injection flow rates, flowline temperature, leak detection and gas detection, creating actionable knowledge (either through automation or by getting the right information visible to the right people, so they can take the appropriate action).

The impact you can have



Employing additional technology at the transition point from upstream to midstream production is an area ideal for IIoT visibility. Typically, wells grouped together will produce into a gathering station. By measuring output, as it is often a custody transfer point, as well as gas quality, producers can confirm that the yielded product is monitored before entering the midstream transfer.

Using wireless, purpose built gas chromatographs, producers can monitor the quality of gas production across the entire reservoir. Imagine a field where a producer can pinpoint gas quality issues and correct them before it gets downstream causing wider operational challenges.

Producers can have key information coming in from each production area confirming the quality of gas being produced. They can also confirm exactly the quality of gas being sold, thus verifying the quality and transfer quantities at the custody transfer point.

Clearly, the industrial IoT is here today, being used in thousands of unique applications globally. Wireless sensors have opened up countless new opportunities and are now able to quickly deliver bottom-line results. Using wireless to implement a pervasive sensing strategy is critical to improving production and becoming more competitive in these challenging times. AOG

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