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Convert your refinery data into profits

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Crude oil is a mix of complex organic molecules, the composition of which is unique to its source. By itself, crude oil has little economic value. Its true value is realized only after it has been refined into usable commercial products. The art of refining seeks to optimize existing assets, processes and workflows to meet a dynamic product demand using shifting crude oil slates against a changing background of government regulations. Anything that can move the needle toward more production while using less energy to get there can make a significant improvement to the bottom line.

While digitalization has been touted as the next wave of industrial modernization, few are willing to risk their money and reputations on expensive new digital technologies like digital twins, robotics, drones, augmented realities, edge computing and the Internet of Things (IoT). The initial costs are high, the learning curves are steep and the returns on investment are uncertain. One proven, low-cost and low-risk opportunity that is frequently overlooked is extracting revenue from existing digital assets. According to a September 2019 *Forbes* article, "Refining the Oil and Gas Industry with IoT," oil and gas companies can realize a 5%–8% production improvement simply through the proper utilization of their data.

Your data is a complicated mix of sensor values, computed targets, alarms, lab results, rounds reports, text, images and end-of-shift notes unique to each refinery. By itself, this data has little value; however, real economic value is created when your data is refined into usable information streams that can be utilized by your personnel.

Your refinery operates like an army where each worker performs specific tasks: everyone's job is tightly interconnected with everyone working toward a set of common goals established by management. Success is measured by meeting these goals on time, within budget and with no harm to people, equipment or the environment. To achieve success, everyone must perform the right actions at the right times, and this requires two things: experience and information. Experience comes with time and training, and information comes from your data. The more you can do to enhance a worker's experience, as well as provide vital information they can access and use, the better the decision-making process becomes, leading to improved performance.

Context. Raw data does not equal information. Rather, it is nothing more than a collection of numbers and letters, and without context it has no value. Context imparts meaning, relevance, significance and understanding. Context is far more than just a descriptive name for a data point; it is a dynamic, multi-dimensional collection of critical metadata.

Adding context can be performed in many ways and imparts meaning, instructions and history. This dynamic process evokes a visceral resonance producing real effects. For context to be effective, the information must be filtered to meet the unique needs of each user.

In industry, context is the "tribal knowledge" used to make the right decisions and perform profit-generating actions. This context comes from many sources, is stored in many places, and is passed on verbally, added to drawings, documented in shift reports and recorded electronically in many different forms. It can take years to assimilate data and context into knowledge. Data changes frequently and context is unique to each location and job type. How information is processed and consumed varies greatly. Managing this context must be as effortless as possible. Rather than workers finding the right spreadsheet to populate, what if one central application collected and displayed this information and provided a simple, single-point-of-contact interface for viewing, inputting and editing this context?

The lowest-risk, highest-return method to extract the maximum value from your existing raw data is a process-monitoring-and-information-sharing platform. This is an enterprise-level software solution that aggregates your raw data across multiple stand-alone silos and provides specific, real-time, context-rich information to every worker, enabling them to make important process decisions and perform the correct profit-driven actions. At a minimum, it must:

- Be flexible enough to conform to your current work processes
- Use your existing IT and OT data infrastructure
- Adhere to increasingly vigilant industry standards and government regulations
- Access your stand-alone process historian, alarm console, lab data, rounds data and shift reports
- Provide fields where context can be viewed, input and edited
- Maintain single-point-of-truth data sources to avoid data duplication
- Provide fast and accurate search results for current and historical information
- Be accessible on any device to anyone on your intranet
- Allow authorized users to perform selected tasks
- Filter the displayed information by unit location and job assignment
- Recognize that users have unique requirements, and let them design the human-machine interfaces to meet their needs and optimize their actions
- Implement from the "top down" and operate from the "bottom up"
- Integrate context-rich information into end-of-shift reports and other important workflow documents.

In FIG.1, raw data is given context to generate usable information. When this information is used by experienced workers, it generates knowledge. A knowledgeable worker makes the right decisions that result in performing safe and correct actions. Performing more correct actions in a shift translates into fewer costly mistakes and improved productivity. Better decisions translate into higher profits. Operators who have worked in facilities where process-monitoring-and-information-sharing platforms have been implemented state emphatically that they will not go back to the way it was before.

The promise of the Industrial IoT (IIoT). Refinery assets are vast and interdependent networks. The size and scope of data being generated is already overwhelming. Variables that affect key business decisions no longer change every 30 days to 90 days; now, they change in a matter of minutes, or even seconds. The promise of the IIoT is to solve problems by generating more data to create a clearer picture. However, more data only generates more confusion for the end user. IIoT-enabled devices are here and are being installed in your refinery. It is important that the data they generate are properly filtered and given the right context to become a useful and profit-generating asset.

Takeaway. Production and quality improve when you provide your experienced workers with good information. You save money when the right decisions are made and good actions are performed. Your current data resources can be leveraged into substantial savings.

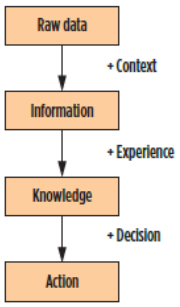

FIG. 1. Converting raw data into profit-generating actions.

- Your raw data resources hold significant financial potential
- Raw data must first be given context to become useful information
- Context is multi-dimensional and comes from many different sources
- Good experience and good information result in good decisions
- A quality process monitoring and information-sharing platform provides a solid benefit to your refinery and your bottom line.

Considering your refinery's dynamic throughput and margins, what does a 5%–8% improvement in productivity and profitability actually mean to you? You just might find yourself saying, "We are never going back to the way it was before." ●

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