Best practices in meeting oil and gas data acquisition needs

By Maria Hansson, Kontron

Service providers must carefully evaluate available computing options to find the optimal intelligent system.

Similar to other industrial markets, oil and gas operations are realizing the powerful results of harnessing data to improve processes, make more-informed business decisions, and manage safety, maintenance, and costs. The information that can be collected and managed from the broad range of disparate sources is growing at such a fast pace, many service providers see the need to upgrade their data acquisition capabilities. With almost every aspect of industrial oil and gas operations being digitized, embedded computing solutions play a significant role in advancing and streamlining oil and gas data acquisition. Using the computing performance and features available in today's systems enables offshore operations to keep pace in a world where data collection and analysis never stops. This industry calls for computing solutions to be "rugged by design," comprised completely of components that have demonstrated reliability in order to meet mandated uptime goals, regardless of the environment.

Previously, computing challenges were met with proprietary systems. Oil and gas service providers also struggled to compensate for systems that often lacked the level of ruggedized reliability essential for this harsh environment. Today, computing solutions manufacturers offer systems that promise to reduce both operating and maintenance costs, and deliver robust technologies that ensure long-term system performance. However, to find the right solution necessitates that important considerations, which can maximize and differentiate their offerings based on performance, value, and reliability, are taken into account. Oil and gas system developers are evaluating every aspect of system design and deployment where they must consider everything from manufacturer support, lead times, and features that maintain long-term system viability.

Key trends affecting data acquisition technology

Previously inaccessible and unconventional sources of oil and gas present a new set of challenges for offshore service companies. Computing solutions must step up to meet more demanding data acquisition requirements from emerging growth areas in challenging environments. These solutions must also provide the high-performance computing resources that ensure state-of-the-art connectivity for the complex labyrinth of exploration, equipment management, control, and analysis applications currently in operation. Therefore, it is wise to seek out decidedly experienced suppliers that have an understanding of the safety certifications and global support needs unique to offshore providers.

Along with highly integrated computing solutions that can help streamline processes by delivering optimized performance and connectivity, these systems must also meet the growing dependency on automated applications that can remotely monitor an increasing variety of equipment deployed at drilling sites; data collection and analysis are crucial to a rig acting as a small, self-contained city that operates nonstop.

There are also 24/7 uptime requirements to contend with. While avoiding downtime is an ongoing need in most embedded applications, it is critical to maintain maximum and sustained operations in offshore installations. Downtime due to system failure affects overall production, which can significantly impact costs that can run in the hundreds of thousands of dollars daily. Because offshore drill sites are inherently remote, they add to operational complexity and compound potential losses considering the extended time and resources that required to get a system up and running after failure. Consequently, data acquisition computing solutions must stand up to the rigors of shock and vibration, temperature, dust, and other environmental conditions common to offshore installations (Figure 1).

[Figure 1 | Embedded developers face a unique set of design challenges in the oil and gas arena, and must deliver high-performance systems build to withstand extreme environments, while also optimizing emerging performance and connectivity requirements.]

Best practices also must include a spectrum of design features such as delivering the highest mean time between failure (MTBF), experience with ruggedized enclosures, and thermal management, as well as worldwide technical support.

Evaluating industrial computing systems

Rugged performance:

Oil and gas settings are unlike any other kind of work environment on earth. Attention to shock and vibration and atmospheric contaminants such as dust, water, and corrosion are vital concerns.

Best practices in specifying data acquisition systems need to address these types of environmental demands with features and capabilities specifically tuned to oil and gas requirements, such as removable dust filters that eliminate the impact of dirt entering the system. Cable tie-downs and hold-down brackets for expansion cards brace computing systems against shock and vibration; shock-mounted drive bays add stiffness in the chassis design, protecting systems during transport and while operating on or near the source of heavy vibrations.

When evaluating industrial computing systems, reliable extended life and guaranteed long-term availability of components must be supported for performance over continued offshore deployments. The most desirable systems are revision controlled for ease of in-field maintenance. For example, Kontron's KISS Oil & Gas 2U, a rugged rackmount computer, is based on Kontron's extensive experience delivering deployable computing solutions such as its KTQ77/Flex motherboard. Components are sourced consistently from the same manufacturer, maintaining performance and features even when there may be years between system deployments (Figure 2).

[Figure 2 | Kontron's KISS Oil and Gas 2U rackmount server is optimized for high MTBF, and based on the

Kontron KTQ77/Flex motherboard that integrates the 3rd Generation Intel Core processor. The data acquisition platform offers extended temperature and efficient cooling, as well as rugged by design features that enable it to be used in harsh offshore environments.]

Assembling compared to developing technology

The quality and reliability of computing solutions are obviously a result of the components, materials, processes, and development expertise that go into the design and manufacture of the product. Many data acquisition suppliers assemble third-party components to build their products rather than actually owning the core computing technology.

Developers of technology provide unique value for oil and gas operators, giving them more product life control and the ability to integrate the technologies necessary to minimize downtime. With an oil and gas system actually developed by the supplier, customers benefit from strategic partnerships that assure access to the latest processors, chipsets, and memory. Technology developers typically provide additional customization capabilities based on standards methodologies to enable faster and more cost-effective custom design options. Furthermore, developers are able to fully manage the bill of materials (BoMs), along with revision control and long-term availability so that performance and features can be controlled even over course of long durations between system deployments.

Global technical support:

The complexity of data acquisition may require extended service, training, and technical support to match uptime goals. Embedded computing suppliers must readily provide a global service organization to more easily facilitate local technical support, as well as more difficult maintenance or upgrades.

Unfortunately, many of today's oil and gas computing suppliers are either large firms with a single hub, or smaller regional firms without a global organization. Therefore, it should be an important criterion that system support is available in the region where the system is deployed.

Enhancing productivity and growth potential:

Providing the increased ability to collect and analyze data, new computing technology is enabling drilling in regions once considered undrillable. At the same time, oil exploration and extraction processes generate tremendous amounts of data. As new devices track a wider array of performance information related to reserves and equipment, industry analysts such as oilprice.com are predicting a doubling of oil and gas data within just two years[1].

Managing such large amounts of data requires sourcing technologies already proven to handle the workload. These solutions must provide connectivity to the critical equipment at drilling sites across the globe, and enable remote access to data from the drill site. Used for applications such as gathering sensor data and the monitoring of an exhaustive variety of instrumentation, exploration, and wellhead equipment, these systems are expected to strengthen productivity. By connecting field staff with industry experts, oil producers can make better critical decisions based on easily accessible, real-time data.

This ability to access real-time data increases safety operations, for example, by means of ultra-reliable sensors and monitors that are capable of shutting down systems at the first sign of trouble. The near future will see more sophisticated smart monitors, predicting failures and providing solutions that execute automatically in advance of problems.

Data acquisition solutions are designed to help producers find and maintain new and untapped resources to realize anticipated growth potential. According to industry analyst oilprice.com, subsea technology developers forecast spending to increase as much as five times (to $130 billion annually) by 2020, where some of this budget will need to be made in data analytics and computing support[2].

Employing advanced data acquisition computing technology provides the data processing, storage, and connectivity to move massive amounts of data, for example, in high-definition seismic imaging. Information that once took decades to analyze and understand is now adding production value in a matter of weeks, guiding exploration and streamlining processes. It appears that combined with enhanced oil recovery (EOR) techniques that re-invigorate existing wells, offshore producers are poised for growth.

Business intelligence from valuable data assets

Oil producers are seeing the value of data collection and analysis gained from high-performance and robust technology solutions. Knowledgeable embedded computing providers can be indispensable engineering resources – from full control of the motherboard and technology revision control to enabling faster, longer, and more reliable data acquisition system deployments. These same suppliers can also lend a hand in maximizing essential operational uptime through global technical support teams. These important considerations also enable oil and gas service providers to achieve leadership by sourcing computing systems optimized for oil and gas environments.

Oil and gas exploration and production has always been complex, but today's competitive landscape dictates even greater attention to computing performance. By capturing sophisticated data for field use and analysis, selecting the right data acquisition system helps take advantage of the growing use of sensors and networks. Ultimately, more intelligent systems will make an important difference in oil production worldwide by connecting decision makers with critical data and improving the safety and productivity of drilling operations.

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References:

1. OilPrice.com. “The Most Lucrative Investment in American History.” http://oilprice.com/Energy/Energy-General/5-Trends-that-are-Set-to-Transform-the-Energy-Sector.html