

» Whitepaper «



Oil and Gas Data Acquisition: Strategic Considerations Impact Rugged Computing Investments

High Performance Connected Systems Enable a Competitive Edge in
Oil Exploration and Production

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The advanced processes of oil and gas exploration and production today generate a tremendous amount and variety of data such as seismic information, machinery performance, geographic modeling, environmental conditions, oil flow rates and pressures. To capture maximum business value from this data, service providers are relying more and more on intelligent embedded systems to transform standalone data processes into connected systems. As a result, oil and gas operators have greater access to sophisticated, real-time analytics that enhance business decisions, help to reduce costs and provide a tangible competitive asset.

Because oil and gas companies need every bit of insight they can collect from data, they must invest wisely in rugged, high performance computing solutions that help keep information flowing. Outdated systems don't offer the performance, connectivity and robust features demanded in this environment. To stay competitive, legacy systems need to be replaced with more efficient, rugged embedded computing solutions that also give operators the added benefits of increased quality, reliability and proven, long life availability. Every aspect of these rugged computing systems must contribute to reliability, and maximize uptime backed worldwide by experienced technical teams.

This white paper details the best practices for defining optimized oil and gas embedded computing systems. It presents the advantages of using Kontron's oil and gas platforms including the company's proven history of rugged system deployments and its exceptional worldwide support organization. These advantages enable rugged performance and connectivity, simplify development for OEMs and give oil producers a competitive edge with fast, proven deployment in new and more remote geographic regions of the world.

CONTENT:

Data Drives the Oilfield	4
Technology Revolution in Oil Markets	4
Satisfying Rugged Reliability	4
Developers vs. Assemblers of Technology	5
Global Availability and Support	5
Differentiating Reliability with Advanced System Testing	5
Connected Systems on the Oilfield	6

Data Drives the Oilfield

Oil and gas exploration has always been difficult, complex and costly—recognized as a process that depends upon vast amounts of data to guide decisions, processes and production. Today new supply sources, such as deep water wells, shale booms or the oil sands, are building on this legacy. Companies are now focused on tapping into more unconventional and remote energy sources, which in turn necessitates even greater data capture to realize its full potential.

According to one oil and gas service provider, mature oil fields provide more than 70 percent of the world's oil and gas. Many of the same fields are in second and third phases of production—the more accessible oil and gas have been extracted, and more sophisticated computing technologies are required to extend the life of these aging fields. Data provides the tools to, for example, analyze high definition seismic imaging. What used to take decades to examine and understand is now adding production value in a matter of weeks. Advanced data acquisition systems employed around the world can be used in so many ways to help build long-term revenue by guiding exploration, streamlining processes and enabling worry-free operation. As a result, system investments are growing steadily. For example, industry analyst oilprice.com anticipates subsea technology development spending, which includes computing and IT support equipment, to increase as much as five times its current level (to \$130 billion annually) by 2020. IDC Energy Insights predicts that by 2017, 100 percent of the top 25 oil and gas companies will apply modeling and simulation tools and services to optimize oil field development programs and that as many as 25 percent will require these tools in order to compete.

Technology Revolution in Oil Markets

Embedded computing resources are at the heart of this new dynamic, enabling drilling in areas once considered inaccessible at any cost and allowing producers to more effectively manage data essential to exploration and day-to-day production operations. Using the concept of the Internet of Things, more systems and processes are being connected on the oilfield; the industry itself is making monumental progress by incorporating computers and sensors that take equipment control and data processing to the next level. Used for applications such as data acquisition, control room management, exploration and wellhead monitoring, these systems help create a safer and more productive environment. By connecting field staff with world-renowned experts, oil producers can make informed critical decisions based on the evaluation of easily accessible, real-time data.

Managing increasing amounts of data in the field requires a more specialized high-end, rugged computer that offers both performance and reliable connectivity. By turning standalone systems into connected intelligent systems, equipment at drilling sites provides access to essential data at some of

the most challenging environments across the globe. These high-performance systems must be built to withstand rough handling and provide 24/7 operation in extreme environmental conditions ranging from the Arctic cold to desert heat.

Satisfying Rugged Reliability

Unique oil and gas market needs are further complicated by severe environmental design challenges. Working with worldwide computing manufacturers is now a necessity to address these requirements, ensuring that every aspect of performance and system development is considered as a means of ensuring reliability. While avoiding downtime is essential in most embedded environments, it is an absolute necessity in the oil and gas industry as system failure equates to lost revenue. Failure can also be based on the mere challenge of getting the same system back in place quickly. It all comes down to maintaining the highest reliability and every feature or component in the system should be evaluated from that perspective. Going beyond uptime assurances, systems with long-term availability reduce in-field operational costs and the need for frequent personnel training. Connected systems extend value even further, enabling remote system debugging. Best practices for oil and gas computing also include uninterrupted supply lines and ready access to knowledgeable global support.

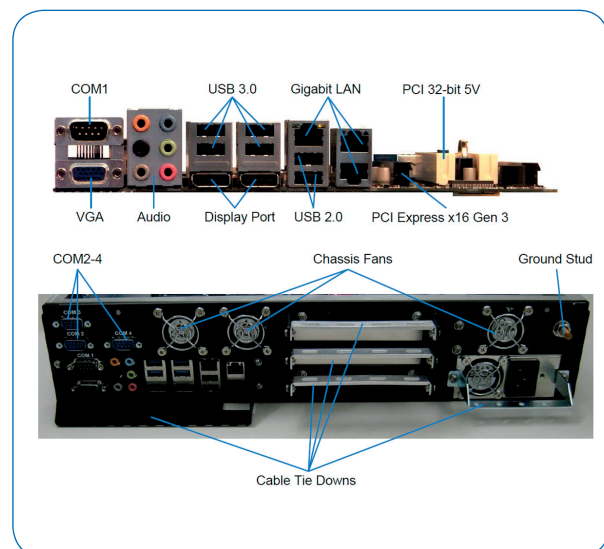


Figure 1: Kontron's KISS Oil & Gas 2U includes front-accessible dust filter, rear cable tie-downs, card hold-down brackets for I/O expansion cards, shock-mounted drive bays and memory hold-down brackets.

With decades of rugged design expertise in military, avionics and industrial deployments, Kontron is well-versed in the environmental rigors of oil and gas exploration and production. Using this experience, Kontron specifically optimized its KISS Oil & Gas 2U platform for oil and gas industry needs. It gives operators the processing performance and connectivity required while also meeting extreme considerations of shock, vibration and temperature.



Figure 2: Kontron's KISS Oil and Gas 2U rackmount computer is optimized for reliability and high MTBF, built in the US and has worldwide technical support. KISS is ruggedized for oilfield deployments, with front-accessible dust filters for easy removal and cleaning in the field.

Developers vs. Assemblers of Technology

Quality and ultimately reliability of a product is the culmination of the components, materials, processes and development expertise that comprise its design and manufacture. Unlike other suppliers who just assemble components, the Kontron KISS 2U platform is based on the company's own motherboard. Kontron's proven history of developing and deploying computing boards and systems provides unique value for oil and gas operators. Because Kontron has full control of the motherboard at the core of the KISS Oil & Gas 2U platform, it can ensure long-term availability and the ability to integrate the advanced technologies necessary to minimize downtime. With an oil and gas system actually developed by the supplier, customers benefit from a standardized platform supported by Kontron's industry-leading embedded technology partnerships. These strategic partnerships assure access to the latest processors, chipsets and memory. Kontron also offers customization capabilities that help ensure long-term performance, and are based on the company's 'Modified Standards' (MoSt) methodology that enables quick and cost-effective custom design options.

Furthermore, by using a Kontron motherboard, Kontron can carefully manage the Bill of Materials, along with revision control and long-term availability. Kontron's KISS Oil & Gas 2U is based on Kontron's proven KTQ77/Flex motherboard. Components are sourced consistently from the same manufacturer, maintaining performance and features even when there may be years between system deployments.

Global Availability and Support

Ideally, system support is available in the region where the system is deployed. The global nature of oil and gas companies adds complexity to this requirement, and restricts the performance ability of firms with a single worldwide location. Kontron is one of a handful of major manufacturers with a presence for both design and manufacturing in the U.S., Europe

and Asia. By comparison, the rest of the industry is becoming divided into large firms with a single hub, or smaller regional firms without a global organization.

As a global company, Kontron can provide localized technical support in the same time zones to meet customers' crucial needs. This includes the vital option of on-site equipment training for operators, along with access to support that more easily services products to ensure maximum uptime. Competitors, on the other hand, are regionally based and do not or cannot offer the same level of worldwide support.



Figure 3: Users in the field manage simple maintenance; however a higher level of training is frequently requested by the end user. A global service presence is critical for oil and gas installations; global providers can to more easily facilitate local training, while also providing necessary support to meet the primary goal of maximum system uptime.

Differentiating Reliability with Advanced System Testing

For oil and gas deployments, systems must be based on sophisticated testing protocols—simulating the rigors that complicate system performance every day. Kontron executes an extensive range of protocols such as safety and emissions, shock and vibration as the most conventional method to determine Mean Time Between Failures (MTBF).

For vibration and shock tests, the test system is held in a fixed position via girders and threaded rods to a shaker and slip table. Specific levels of shock and vibration are applied and verified on three axes of the test object, in this case the rugged chassis of an industrial PC. Results are reported and evaluated in terms of both mechanical damage and verified functionality. During testing, a running control signal is recorded, and assists in determining any functional issues that may occur along with any mechanical or visual damage to the system.

Results of these tests are represented by the singular MTBF rating—acceptably high, and a good tool for calculating reliability. For oil and gas customers, additional testing can provide greater confidence in system reliability; Kontron performs extended tests such as Highly Accelerated Life Testing

(HALT) and Highly Accelerated Stress Screening (HASS) as needed for system deployment. In a close approximation of real world operations, HALT is performed in the design phase of product development. HALT exposes the product to an incremental cycle of environmental variables such as temperature, shock and vibration, applied together and separately in random combinations. Ultimately it is the goal of HALT testing to break the product; weaker components are identified and addressed one at a time until a high reliability factor is proven. HASS is a form of HALT testing, and is ongoing screening of production units themselves. The purpose of HASS is to not to break the product, but rather to verify its performance during the cycling of various and extreme environmental stresses.



Figure 4: Additional testing is where Kontron differentiates from other manufacturers and improves the validation data that goes into the MTBF rating. Very specific environmental tests, such as thermal modeling, ensure the design layout is functional. The Kontron KISS family of products, including the KISS 2U Oil & Gas system, was tested further to validate its additional protection to adverse environmental conditions. Each KISS product has an IP rating (Ingress Protection Rating), validating resistance to dust and liquid ingress to enhance reliability by keeping harmful contaminants away from internal components.

Connected Systems on the Oilfield

Intelligent systems are making a difference in global oil and gas operations by connecting decision-makers with critical data and improving productivity of the drill site. The ever-increasing amount of data coming from relatively new or untapped resources, such as seismic data, reveals new insights that can be used to drive improved business and operational decisions. It is important to note that as the number of real-time data sources grows, so does the importance of the data itself. Consider a basic operational activity such as equipment maintenance—with data collected from sensors on pumps and

wells, operators can adjust repair schedules and act preemptively to prevent system failure. Anticipating costs and production needs becomes a science, based on accurate, real-time data that allows service providers to employ modeling techniques to predict costs, production volumes and equipment. The same data can be used to optimize pricing, and improve safety with advance knowledge of equipment issues or changes in drilling conditions. Systems such as the Kontron KISS Oil & Gas 2U ensure these processes perform with mission-critical reliability.

New computing technology is unlocking new energy resources worldwide, improving data capture and enabling drilling in increasingly remote and challenging locations. Designers can expect continued growth in this field, as more computers and sensors are deployed and connected and as older systems are upgraded to achieve a new level of compute performance. The rigors of oilfield computing are likely to grow in step, with stringent demand for high performance, rugged solutions optimized for high MTBF to significantly reduce downtime. Backed by global technical support, the focus continuously remains on reliable, long-term system performance.

Embedded computing partnerships can provide a significant competitive advantage in attaining these goals and are seen as integral to an effective embedded system. Selecting Kontron as a technology partner adds value as an indispensable engineering resource who understands not only the technical requirements involved in design, but also trends, industry influences, customer requirements and environmental demands as design elements. Kontron's broad expertise and high-level manufacturing support, backed by decades of design and development of rugged embedded systems, delivers a mature and proven collaboration for oil and gas OEMs. Kontron's roadmap identifies expanded computing solutions for future requirements and its experts stand ready to solve new and continually more challenging oil and gas computing needs.

About Kontron

Kontron is a global leader in embedded computing technology. With more than 40% of its employees in research and development, Kontron creates many of the standards that drive the world's embedded computing platforms. Kontron's product longevity, local engineering and support, and value-added services, helps create a sustainable and viable embedded solution for OEMs and system integrators.

Kontron works closely with its customers on their embedded application-ready platforms and custom solutions, enabling them to focus on their core competencies. The result is an accelerated time-to-market, reduced total-cost-of-ownership and an improved overall application with leading-edge, highly-reliable embedded technology.

Kontron is listed on the German TecDAX stock exchanges under the symbol "KBC". For more information, please visit: www.kontron.com

CORPORATE OFFICES

Europe, Middle East & Africa

Lise-Meitner-Str. 3-5
86156 Augsburg
Germany

Tel.: +49 (0) 821 4086-0
Fax: +49 (0) 821 4086 111
sales@kontron.com

North America

14118 Stowe Drive
Poway, CA 92064-7147
USA

Tel.: +1 888 294 4558
Fax: +1 858 677 0898
info@us.kontron.com

Asia Pacific

17 Building,Block #1, ABP.
188 Southern West 4th Ring Road
Beijing 100070, P.R.China

Tel.: +86 10 63751188
Fax: +86 10 83682438
info@kontron.cn