



IMPLICATIONS OF INDUSTRIAL IoT ON RACKMOUNT DESIGN

HOW THE LATEST INDUSTRIAL REVOLUTION IS NECESSITATING
A NEW CLASS OF CONNECTED, INDUSTRIAL GRADE RACKMOUNT
COMPUTING PLATFORMS

▶ ADDING VALUE AND COMPETITIVE EDGE TO YOUR RACKMOUNT COMPUTER DESIGN

THERE IS THE NEED FOR A NEW CLASS OF COMPUTER TECHNOLOGY, CAPABLE OF PROCESSING AND STORING THE VAST VOLUME OF DATA THAT WILL BE GENERATED BY THE WIDESPREAD CONNECTIVITY OF 'SMART' INDUSTRIAL SYSTEMS, EQUIPMENT AND DEVICES.



// INDUSTRIAL IoT - ENABLING PREDICTABLE PRODUCTIVITY

Industrial computing is undergoing a revolution. This is known as and is being driven by the Industrial Internet of Things (IIoT). By leveraging data from IoT connected sensors, devices and assets ("things"), it offers all kinds of industrial sectors the ability to gain access to highly accurate and actionable information about their operations in real time. This can add value and competitive edge by enabling all manner of things to be done smarter, faster, more safely and efficiently, while also reducing costs and time to market.

The scale of this 21st Century industrial revolution is vast. In January 2015 Accenture released a report which concluded an industrial version of the Internet of Things could add \$14.2 trillion to the world economy over the next 15 years. IMS Research figures show the global market for industrial automation is already generating \$200 billion in 2015 while Frost & Sullivan have forecast the market for industrial networks and communications technology will grow from €854 million in revenue in 2010 to €1.6 billion this year.

As the Industrial IoT makes data acquisition viable and accessible to industrial organisations on a massive scale, one of the key implications is the need for a new class of computer technology, capable of processing and storing the vast volume of data that will be generated by the widespread connectivity of 'smart' industrial systems, equipment and devices.

This whitepaper discusses embedded rackmount computer design requirements for the new IoT age. Some OEMs and designers are already striving to meet the new demands of traditional manufacturing customers as well as those operating massively connected data acquisition systems in extreme or semi-permanent production environments. As part of this it discusses emerging Industrial IoT application areas and presents the advantages of using Kontron's rackmount computing platform to OEMs and designers requiring industrial grade performance, connectivity, low noise, reliability and simplified development.

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ONE OF THE CHALLENGES IS THE PROVISION OF POWERFUL SYSTEMS CAPABLE OF PROCESSING, STORING AND MANAGING THE EXPONENTIAL GROWTH IN DATA.

NECESSITY LEADS TO INNOVATION

While many manufacturing companies have been using sensors to monitor the condition of plant and machinery on the factory floor for some years, the Industrial IoT dramatically expands on this approach by enabling a much broader set of measurement parameters to include firms in oil and gas exploration and production, power generation, mining and excavation. It will also extend to specialised control room applications in such areas as buildings automation and broadcasting.

At the same time many more industrial organisations will expect to take full advantage of the IoT by converging their operational (OT) and enterprise (IT) systems end to end, thereby allowing holistic, real-time data acquisition to provide more accurate and actionable management reporting. This has called for new thinking in rackmount computer design which delivers not only durability but also a high degree of connectivity together with unprecedented performance, reliability and low cost of ownership.

NEW THINKING ON RACKMOUNT COMPUTING DESIGN

The growing demand for connecting more and more equipment operating brings with it a number of challenges. One of the most pressing embedded computing challenges is the provision of powerful systems capable of processing, storing and managing the exponential growth in data. This has called for new thinking on embedded computer design which takes account of the increased storage, processing and graphics performance requirements and combines them with connectivity, scalability, reliability and ease of configuration.

At the same time the next generation of industrial automation rackmount platforms must be more compact when they are deployed in field-based environments or in confined or semi-permanent spaces.

It goes without saying they need to be corrosion resistant and vibration-proof to withstand harsh operating environments, rough handling and extreme temperatures, from the heat of the desert to the arctic cold.



// SILENT OPERATION IN MEDICAL ENVIRONMENTS

Furthermore, near silent operation will become increasingly necessary in a number of diverse environments where low noise levels are a top priority, such as in control rooms, buildings automation environments, and of course in situations where personnel are working in close proximity to IIoT-enabled electronics equipment, from factory production lines to hospital operating theatres.

Industrial IoT rackmount computer design requirements from industrial systems designers

- ▶ Low noise design
- ▶ Long lifetime support
- ▶ Minimised downtime
- ▶ Latest generation processor architectures
- ▶ Shock, corrosion and dust proof design
- ▶ Excellent thermal design
- ▶ Hot swap chassis fans
- ▶ Easy maintainability



// KISS 4U KTQ87 / KISS 2U KTQ87 / KISS OIL & GAS 2U

RELIABILITY AND LONGEVITY

With globalisation and the very nature of the IoT model where everything is interconnected, the strategic importance of industrial computing solutions providers being able to guarantee superior MTBF and worldwide support is clearly highlighted. Any unplanned computer downtime is potentially damaging and costly, but in the IoT super-connected world this would be disastrous. Industrial IoT ready hardware will therefore need to include comprehensive condition monitoring capabilities for ensuring maximum reliability.

Extended IT product lifetime and lifecycle and worldwide support will also become much more critical. This is because in most industrial OT environments plant and equipment is expected to last for many years and IT can be no exception. Long-term product availability and utilisation of industry standard components for easy maintainability will become the norm, therefore allowing customers to maximise ROI while also minimising their servicing and maintenance costs for optimised TCO.

RACKMOUNT APPLICATIONS IN THE NEW INDUSTRIAL AGE

While the full effects and implications of the Industrial IoT are still to be seen, with many new applications and requirements yet to emerge, the evidence so far strongly suggests that purpose-designed IIoT ready rackmount computing platforms are essential in a number of key areas of automation. These can be best categorised as follows:

Extreme Production Environments

Oil and gas exploration and production environments perhaps epitomise this category although similar challenges and requirements are found in other energy engineering sectors including mining and excavation, even wind farms, where connected real-time data collection and analysis is a priority.

In fact, in any areas where the field and control centres are subjected to harsh environments or located in semi-permanent structures. Rackmount computers must therefore be able to cope with shock and vibration stresses as well as dust and the temperature extremes common to such installations.

Control Room

Control room technology is used in a wide range of applications from utilities managing the generation, distribution and transmission of electricity, water and gas; to broadcasters controlling multiple incoming and outgoing feeds; and in automated buildings for controlling heating, air conditioning, ventilation and security.

Multiple data sources need to be visually displayed in real-time, often on video walls through the deployment of sophisticated display control systems and controllers which produce graphical and data applications in various formats for displaying SCADA applications, videos and schematics.

Such applications increasingly demand rackmount platforms with higher speed processing, greater storage capacity and high graphics performance along with the flexibility to connect many different types of visualisation devices. At the same time low noise operation is becoming a very important requirement in control room environments where system operators expect complete silence.

Manufacturing Quality Control

Optical inspection processes used on factory production lines increasingly require servers with superior graphic processing power, connectivity and local storage. At the same time, with powerful machinery operating in close proximity, rackmount design must factor in shock and vibration.

RISING TO THE CHALLENGE

Kontron has been designing and manufacturing embedded computer systems, subsystems and computer boards for the extreme needs of the military and industrial use for decades.

Utilising this expertise has led to the introduction of a next generation line of 1U, 2U and 4U industrial grade Kontron KISS rackmount computing platforms which are fast becoming established as the 'powerhouse' behind many IIoT applications and have already set the standard for near silent operation - at 35db almost half the noise level of normal conversation.

TOTAL FLEXIBILITY

Successfully combining flexibility, processing power, storage capacity, connectivity, reliability and industry leading low noise operation, KISS addresses the rapidly emerging requirements of a broad spectrum of IIoT-enabled industrial automation applications. These include industrial and light engineering, energy production, broadcast and medical. Reduced total cost of ownership (TCO) is provided by the ease of system configuration and proven building blocks design which together ensure non-recurring engineering (NRE) costs and faster time-to-market.

With the increasing importance of low noise operation, perfect thermal management is a fundamental design requirement. Kontron achieves this by optimising airflow through the system to reduce the required air volume which helps keep the fan speed low. The installation of power supplies with larger fans with slower start-up speeds and lower operating rpm offers even further scope for super silent operation. The BIOS can also be specially optimised, for example, to leverage Intel® Quiet System Technology for minimising both CPU and chassis fan speed changes. Even more options for making the system quieter include the use of silent solidstate drives for data storage.

A large array of Intel® based platforms are provided based around two core architectures: passive backplane (SBC) and motherboard. The benefits of the passive backplane are its flexibility to support a greater number and combination of PCI and PCI express expansion slots. These allow integration of existing hardware such as IO, network connection and graphics boards bringing additional up to date functionality such as remote monitoring while running established devices. This increases product life-cycle as does using components from Intel's embedded roadmap - to five years or more. Product lifetime is also enhanced.

All Kontron systems are revision controlled which facilitates field maintenance by enabling fault-diagnosis in advance and ensuring engineers know which replacement parts to carry with them. Since Kontron develops the motherboard, passive backplane and the system, each system is optimised and enabled to meet the specific needs of each industrial application requirement for rapid deployment. In addition, the long-term availability of the motherboard, passive backplane and system reduces in-field operational costs and personnel training.

SUMMARY

The Industrial IoT is bringing a wealth of new possibilities to the field of industrial automation. It is now possible to create and interconnect smart assets everywhere and seamlessly converge enterprise and operational systems in order to enable real-time data acquisition and analysis on an unprecedented scale.

At the same time this industrial revolution has presented new embedded computing challenges including the need for more powerful computing platforms capable of offering connectivity, greater reliability and the ability to withstand increasingly demanding and physically harsh environments.

Kontron is addressing this particular challenge with an extensive range of rackmount server platforms based on industry standard components for enabling ease of configuration and maintainability while offering the flexibility for customisation. This design approach is fast making Kontron's KISS platform the technology of choice to OEMs and system designers working in the new IIoT connected industrial age.

▶ For more information about Kontron embedded rackmount computers for industrial automation including the KISS server range visit: <http://www.kontron.com/industries/automation>

About Kontron

Kontron, a global leader in embedded computing technology and trusted advisor in IoT, works closely with its customers, allowing them to focus on their core competencies by offering a complete and integrated portfolio of hardware, software and services designed to help them make the most of their applications.

With a significant percentage of employees in research and development, Kontron creates many of the standards that drive the world's embedded computing platforms; bringing to life numerous technologies and applications that touch millions of lives. The result is an accelerated time-to-market, reduced total-cost-of-ownership, product longevity and the best possible overall application with leading-edge, highest reliability embedded technology.

Kontron is a listed company. Its shares are traded in the Prime Standard segment of the Frankfurt Stock Exchange and on other exchanges under the symbol "KBC". For more information, please visit: www.kontron.com

About Intel IoT Solutions Alliance

Kontron is a Premier member of the Intel® Internet of Things Solutions Alliance. From modular components to market-ready systems, Intel and the 400+ global member companies of the Alliance provide scalable, interoperable solutions that accelerate deployment of intelligent devices and end-to-end analytics. Close collaboration with Intel and each other enables Alliance members to innovate with the latest technologies, helping developers deliver first-in-market solutions.



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