'WARTUNGSFREI' INDUSTRIAL COMPUTER PLATFORMS

MAINTENANCE-FREE TECHNOLOGY FOR INDUSTRIAL COMPUTER PLATFORMS

▶ INCREASE RELIABILITY AND REDUCE OPERATING COSTS

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'WARTUNGSFREI' (MAINTENANCE-FREE) INDUSTRIAL COMPUTER PLATFORMS
CAN BOTH REDUCE OPERATING COSTS AND INCREASE THE RELIABILITY OF SYSTEM INSTALLATIONS.

// INDUSTRIAL COMPUTER PLATFORMS

By deploying 'wartungsfrei' (maintenance-free) industrial computer platforms , OEMs and operators can both reduce operating costs and increase the reliability of system installations. Eliminating the need for maintenance and the costs associated with it also minimizes production downtime preventing unnecessary profit loss.

The right hardware technology is essential to 'wartungsfrei' (maintenance-free) industrial computer platforms. All system components must be designed for maximum reliability so that failures are eliminated over the course of the system's entire lifecycle.

Software also plays a primary role. For industrial facilities to run at optimum efficiency, operators need to be able to monitor and manage their production processes. That is why Kontron designed its 'wartungsfrei' industrial computer platforms with advanced software to support this necessary functionality.

Consequently, appropriate features are pre-integrated and cloud-based service platforms made available as complete integrated solutions to simplify development for machine and plant engineers. Industrial system developers can put these technologies to use in the overall application to provide a way to constantly and intelligently retrieve big data and manage operations remotely. Maintenance-free systems are paving the way for the new age of the 'Smart Factory' (Industry 4.0) based on the Internet of Things (IoT) technologies.

INDUSTRIAL COMPUTER PLATFORMS - A GROWTH MARKET

For manufacturers and operators, the rapidly expanding number of distributed systems poses mounting challenges. These systems usually require regular on-site servicing, which involves a great deal of expense. The quest is, therefore, to reduce or remove these costs. The result is less maintenance also minimizes production downtime. Applications that can take advantage of maintenance-free industrial computer platforms:

▶ On-site Engineering: Managing a large number of installed systems distributed across various facilities results in complex maintenance issues. Therefore, machine and plant engineers that have a global customer base can especially benefit from on-site, maintenance-free industrial computer platforms.

▶ Energy: Very sizeable and, in many cases, nationwide networks are the norm here. Distances of several kilometers can be common between individual installations such as those in wind turbines, substations or pumping stations. Some networks are spread out over different parts of the country. Maintenance involves travel costs, which can be particularly high in the case of off-shore installations.

▶ Processing: Local, large-scale processing plants have numerous widespread system installations. As in the energy industry, plants are located in areas where personnel visits are primarily for maintenance purposes. By installing on-site maintenance-free systems, this servicing would no longer be necessary. High reliability and remote monitoring and management are necessary for these types of facilities.

REDUCING COSTS AND INCREASING RELIABILITY

Profit losses caused by production downtime for maintenance are a costly issue even if industrial computer platforms only represent a small portion of the maintenance work required in the overall application.

Maintenance costs quickly add up and include expenses for staff travel and replacement parts (both available inventory and newly sourced) that tie up warehouse capacity and capital. Even necessary maintenance planning presents a sizeable cost factor in terms of budget, staff resources and facilities management. Maintenance-free systems allow OEMs to put all these factors aside. No additional special maintenance strategies have to be executed in order to achieve high availability. A positive effect of 'wartungsfrei' (maintenance-free) systems such as the Kontron KBox family is that these industrial computer platforms also increase an application's reliability. For example, maintenance-free industrial computer platforms can be employed in 24/7 operation and ensure failsafe operation. Once installed, these systems continue to run reliably day in, day out for 24/7 operation throughout the designated application lifecycle.

KONTRON 'WARTUNGSFREI' HARDWARE

Kontron specifically designed its 'wartungsfrei' or 'maintenance-free' industrial computer platforms to reduce the "Total Cost of Ownership" (TCO) of computer boards or systems for their OEM customers. Based on the required feature set or performance, to maximize the level of 'wartungsfrei' in all products, Kontron has defined different levels. Kontron's KBox industrial computer platforms meet the following important requirements:

1. No moving parts

A primary requirement of 'wartungsfrei' systems is that they cannot have any moving parts or rotating components, such as fans or hard disk drive storage. Components such as these have a tendency to wear out more easily mandating replacements for long-term installations. They are also vulnerable to shock and vibration, which in harsh industrial environments can increase the risk of failure. Fanless industrial computer platforms with flash-based memory offer the ideal solution, as flash memory does not have moving parts and eliminates mechanical failure.

2. Energy-efficient components

The second precondition is the use of energy-efficient components. The latest processors offer, for example, excellent performance-per-watt ratios generating minimal heat, which makes active fan cooling superfluous. This also reduces mechanical wear. Kontron's KBox family is based on low-power CPUs and energy-efficient SoCs such as Intel® Atom™ processors. High-performance systems delivered in a compact format are also possible with today's advanced processor architectures. Even with high-end Intel® Core™ processors, power consumption can be lowered enough to enable a fanless design.

3. Battery-free operation

Classic button cell batteries, which have to be replaced every two to three years, are not suitable for 'wartungsfrei' systems. Wear-free double layer capacitors, also called gold caps, do not require replacement making them an excellent alternative. These capacitors ensure a continuous power supply to the BIOS or the EFI memory and the internal clock system even when the system is switched off and disconnected. Without a continuous power supply, system settings and the system clock would need to be reset and the system would not be able to reboot without user intervention.

4. Extended power supply functions

Power supplies with high holdup times can prevent a system reset in the case of a quick power failure. During this downtime, the system runs normally and increases the application's availability. Power supplies need to be programmed to automatically reboot a system after a power failure (longer than the specified holdup time). In this way, operation can continue without any user intervention.

5. Long-life components

Ultimately, a system can only be as good as its weakest component. Careful selection of the right components is crucial. Long-life components that offer a high MTBF are essential - it does not suffice to have suitable processors and chipsets that just meet harsh environment requirements. Logically, all the parts on the selected board such as voltage regulators, controllers, and memory modules must be specified to withstand extreme ambient temperatures and temperature fluctuations over time without any adverse effects.

The requirements outlined above highlight at the hardware level there are high demand for each component in the overall system to live up to the 'wartungsfrei' concept. Many of the "wartungsfrei"-specific design features identified are not found in data sheets, making it difficult for developers to evaluate what products provide maintenance-free benefits. To ensure all aspects of high-reliability designs, OEMs need to make very detailed enquires about a system's specifications. Nevertheless, there is much more to 'maintenance free' design than simply using the right hardware.

REMOTE MANAGEMENT FOR 'WARTUNGSFREI' SYSTEMS

Operators need to be able to rely on the functionality of the system. Therefore, all the relevant parameters, the 'big data' these industrial computer platforms must manage, have to be available remotely and around the clock. To achieve this, it is a necessity that an industrial computer platform have networked remote management capabilities. OEMs and operators profit in many ways from remote monitoring and management. First, they no longer have to be present on-site for software updates. Secondly, parallel management of systems is possible. Particularly in large installations where immense savings can be achieved in terms of maintenance and resources. The third advantage relates to installation safety allowing system access via the network so that externally-accessible interfaces such as USB ports or CF card slots are no longer required. This eliminates the risk of misuse such as malware uploading or data theft threats from these ports.

HARDWARE-BASED SOLUTIONS

Intel® Active Management Technology (Intel® AMT) is an important foundation for hardware remote management. Part of Intel® vPro technology suite, Intel® AMT provides the essential basic functions with which OEMs can alter BIOS or firmware parameters remotely, install firmware updates or adjust energy modes. Also, Intel® AMT enables system and software settings to be retrieved, even if a system is shut down. If required, remote system boots can be carried out to allow remote software updates.

SOFTWARE SOLUTIONS

So that developers can take advantage of hardware remote management functionalities, corresponding software tools and matching remote services are essential. Selecting the right software is also crucial as it ultimately determines how system parameters are defined and how they are monitored.

For a wide range of systems and boards, Kontron provides the option of adding its Kontron Embedded Application Programming Interface (KEAPI) and corresponding remote services. The KEAPI is a standardized, cross-platform software library giving OEMs the capability to simplify the development of tailored monitoring and control applications for their systems.

For example, monitoring of processor and housing temperatures is possible along with direct access to the I²C bus or the watchdog. Even failsafe BIOS updates via the cloud are possible with KEAPI, and an additional security layer protects against unauthorized access.

So the basic functions for system monitoring and remote maintenance services that make the Kontron KBox family 'wartungsfrei' are included in the overall system package.
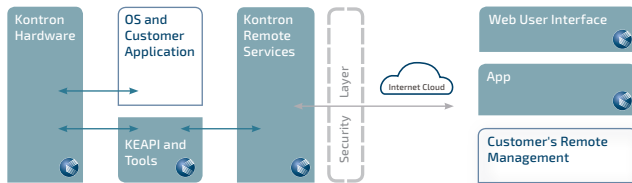
// Using Kontron's Embedded API and additional remote services tools OEMs and industrial automation suppliers have remote access to the hardware functionality of installed systems. Thanks to this, information exchange can be carried out securely and conveniently via the Internet.

In order to achieve 'wartungsfrei' systems, developers should ensure that application software updates do not suddenly bring the system to a halt. Clean lines of code and extensive testing are mandatory requirements to ensure maintenance-free systems.

ENTIRE APPLICATION INTEGRATION PROOF-OF-CONCEPT

When IPC monitoring is installed, OEMs can also use these functions for status monitoring of the whole application including intelligent I/O. In collaboration with Salesforce.com, Kontron has demonstrated how a Maintenance 4.0 concept can operate. The demonstration simulates system errors on a computer controlling an industrial plant, which are routed via the cloud to an employee's mobile device. Additionally, the complete case management, including ticketing and evaluation of the service cases, is carried out directly in the application. OEMs and automation suppliers can implement this proof of concept and offer their own cloud-based maintenance services for their applications. All this can be done without expert knowledge of computer hardware or software technologies enabling OEMs and operators to fully concentrate on development at application level. They can, therefore, provide their customers with profit-increasing, long lasting and value-added services at lower development costs.

'WARTUNGSFREI' SYSTEMS FROM KONTRON

Among Kontron's first 'wartungsfrei' (maintenance-free) industrial computing platforms are the KBox family and its Panel-PC Micro Client 3/ 3W with resistive, multi-touch display. These products are fanless and equipped with flash memory and gold caps. With an MTBF of 40,000 to 70,000 hours depending on the system and configuration, these Kontron industrial computer platforms offer extremely high reliability. This level of MTBF reliability corresponds to 24/7 maintenance-free operation of up to eight years or up to 24 years of single-shift operation. In addition, Kontron systems are characterized by an industrial-grade design and come with a long-term availability guarantee of at least five years. This ensures that customers can obtain systems in an identical configuration for years to come. Importantly, Kontron has control of the entire process starting with the board design and continuing to the production of the complete platform. Besides the actual development of the systems, this also includes assembly as well as management of the supply chain and lifecycle.

Kontron has a proven, long history as a trusted partner for OEMs and industrial automation suppliers on a global scale. Ensuring continuous supply quality with identical configurations (right down to chip level) and an optimized supply chain, Kontron has gained and maintained its innovative industry leadership position. Furthermore, the company has more than 30 years experience in industrial system supply chain management, and has installed and established all the necessary processes and associated QM systems to support the supply chain effectively.

Kontron's comprehensive control of system development allows individual customer requests to be efficiently implemented. In addition, Kontron's extensive design and manufacturing expertise has helped it create a "Modified Standard" (MoSt) concept. This valuable approach enables customers to bring their innovative solutions to market much faster, limiting design risk and reducing development costs.

// Kontron KBOX C-101

Designed for maintenance-free operation and industry-leading performance, Kontron's flagship in the KBox family is a booksize-class cabinet PC designated Kontron KBox C-101. With integrated COM Express® modules, this Box PC is highly scalable to models incorporating powerful 4th generation Intel® Core™ i5/i7 processors. In addition, using customized standard components, upgrades can be carried out quickly while allowing developers a greater degree of flexibility.

// Kontron Micro Client 3/3W

The Kontron Micro Client 3/3W family is designed for monitoring and controlling individual production lines. These advanced HMIs are available with edge- and joint-free 16:9 glass touch displays or in a classic 4:3 format with a resistive touch screen. Based on the Intel® Atom™ processor dual-core technology, they are suitable for the mid-performance class applications. Kontron Micro Client HMIs come equipped with all standard interfaces and offer optional Wi-Fi and /or RFID. Additionally, they also fulfill all the requirements for maintenance-free operation.

// Kontron KBOX A-103

With a wide range of functions and interfaces, the KBox A-103 is ready for the Internet of Things (IoT) using the wifi options via the mini PCI interface and GPRS and LTE data transmissions via the optional SIM card slot. The KBox A-103 is equipped with scalable SMARC™ modules. The modular approach ensures simple upgrades to the next processor generation ("Forever Young") for changing performance requirements. With the "maintenance-free" design, the KBox A-103 does not require any additional batteries for operation, it is very reliable (high MTBF) and easily adapts to customer requirements.

// Kontron KBOX A-201

The KBox A-201 Industrial Computer Platform offers IoT gateway intelligence that is highly sophisticated, standardized and easily deployable. OEMs can seamlessly connect their distributed systems via wireless networks such as LTE, GSM or WiFi. OEMs and operators will benefit from a pre-validated, standard-based platform for capturing, analyzing, and utilizing all the big data that is required today to achieve significant new business advantages.

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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