

Ultra-rugged Embedded Computer: the one for the rough stuff

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This article introduces the rugged computer RPC Compact 71 which is protected to category IP67 and has a fully enclosed housing, as well as the matching M12 plug connectors.



■ Salt-laden air, oil or dust, extreme temperature fluctuations, vibrations and/or shocks – these kinds of environmental factors usually mean devastation for electronics and especially for a computer system. Even rugged industrial computers usually have to surrender in their fight against such environmental conditions.

Early system failures can mean all kinds of hassles. The possible causes can be manifold. Air containing salt for instance can mean corrosion inside the device, which may then very well lead to later malfunctions. Should dust ingress into the industrial unit because of a leak in the housing, it could cause sudden failure. Another reason for failure in industrial systems which are exposed to constant environmental vibrations can be improper connectors or storage media. In addition, extreme temperatures create difficult operating conditions for the average device - like difficulties starting when it is cold, or even permanent electronics damage under sustained high heat conditions. In short, the traditional industrial computer is only suitable to a limited extent under extreme conditions.

The consequences of an early failure can be devastating. Depending on the application, such production downtimes or unscheduled maintenance events will cause losses to the

bottom line and a great deal of frustration. In worst case scenarios these failures can even become a danger to people, especially in cases where these computers have been integrated into vehicles. There are a number of applications that demand using an industrial computer, which is able to run reliably even under the most extreme of conditions. This includes their incorporation into construction equipment, special-purpose vehicles, mining and railway applications, as well as their use in the maritime environment.

The market offering of suitable equipment is rather limited. The embedding specialist Syslogic has recognized this need and developed a brand new device, which is setting new standards in stability. The main features of the RPC Compact 71 are its enclosed aluminum housing with IP67-protection rating and the M12 interfaces. This makes it resistant to moisture and dust-laden environments. In order to achieve a uniform pressure load in spite of the completely enclosed housing, the Rugged Box Computer features a Goretex valve mounted to its sidewall.

The new Ultra Lock series M12 connectors by Molex withstand the constant vibrations and are also certified to common industry standards. Syslogic does not only value a robust design, but also the best possible user

comfort and an uncomplicated commissioning. The M12 plugs have a practical Bayonet closure for quick and simple peripheral connections. In addition, the company furnishes the M12 cables with conventional counterplugs with its test equipment. The M12 plugs come equipped with standard USB, Ethernet, RS232, RS422/485, CAN and VGA. The electronics layout is arranged so that modifications to the interface configuration can be done quickly and cost effectively. There is also an integrated wireless model available, which features GSM/GPRS/UMTS, as well as W-LAN and GPS.

But not only are the M12 plugs extremely robust, even the Computer-on-Module (COM), the real heart piece of the computer, has been developed by Syslogic. This shows how dedicated the engineers were to this ultra-rugged approach. The robust CoreExpress pluggable cord connectors, as well as its protective paint, are important features of the COM boards. The CoreExpress connector technology is qualified for harsh industrial environments, in contrast to some other COM standards, and has already been proven in various automotive applications. The company now manufactures the COM board in their own state-of-the-art production, along with the rest of the device.



The kind of protection offered by the Embedded Computer is usually only available in military equipment.

This same uncompromising attitude was pursued for the line of industrial processors. The COM boards are equipped with the Atom-E processor by Intel. They are designed exclusively for demanding industrial applications. Producing very little waste heat, because of low power consumption, it will have a positive effect on MTBF values and ultimately on the lifecycle of the entire Rugged Computer. In addition, all the COM board components, as well as the rest of the Rugged Computer components are designed for an extended temperature range of -40 to +85 °C (-40 to

+185 Fahrenheit). Syslogic does not depend on just the screening method for determining the temperature range, as is the industry standard, but defines which loads the components will have to withstand already in the development stages.

Another characteristic of the robust electronics is the galvanic isolation of their interfaces. This protects electronic components from damage, even in case of massive potential differences, caused by long cables for example. Another must-mention feature is the SSD

(Solid State Drive) memory, which has been incorporated into the Rugged Computer's design as well. In contrast to conventional hard disks, the SSD operates in a static state. This design is substantially longer lived than conventional hard disks that fail under vibration and shock conditions at a much earlier stage, because of their mechanical recording heads. In the selection of this memory Syslogic is able to benefit from the know-how of its sister company Systronics, which specializes in the distribution of industrial flash players. The Embedded Computer uses the SSD memory designed by Cactus Technologies, a specialist in the industry. Thanks to their SLC (single level cell) flash components and intelligent controllers, this memory is able to guarantee a 24/7 lifetime operation for up to 25 years.

RPC Compact 71 has proven its virtual indestructibility not just on paper, but with numerous continuous real-life operations for railway, automotive, construction and wind energy applications. Some of the endurance tests passed include vibration testing for frequency ranges of 5 to 2000 Hz (EN 60068-2-64) or shock testing (EN 60068-2-27). The Embedded Computer devices comply with EMC regulations. Additional testing has shown that the devices even meet Russian GOST standards. That means a cold start is expected to be possible at temperatures of -50 °Celsius (-57° Fahrenheit). The rugged housing with its clever Goretex module makes the Embedded Computer also suitable for potentially explosive environments. ■