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The latest quarterly report from the EEF, the manufacturers’ organisation, shows a sector in relatively rude health, following two years of uninterrupted growth.

In its latest snapshot on the state of manufacturing in the UK, the EEF suggests that the sector remains ‘in the black’ and says that it’s likely to remain the case throughout the rest of 2018.

The report says that the UK has benefitted from an improving global economy and the electronics sector has been particularly strong, in fact, they describe it as the standout performer this quarter.

According to the EEF, the strength in activity in electronics should not be seen as surprising. It is riding high on a global boom with strong demand, in particular, from Asia and the US.

The strong performance in the survey is backed up by official data (and semiconductor sales), and the EEF is expecting that overall, electronics will expand by a ‘whopping’ 10% this year.

However, this impressive performance is in stark contrast to electronics’ sister sector, electrical equipment, which has had a torrid time - contracting by 5% and 6% over the opening quarters of 2018.

But while the electronics sector may be motoring, the EEF warns that momentum is slowing. Recent figures point to growing weakness, not only in the UK, but across Europe, China and Turkey.

Bosses are said to be increasingly worried by the ongoing trade war between China and the US, which in turn is having an impact on manufacturers in the UK and Europe. UK manufacturers have seen foreign demand decline for the first time in two years, despite Sterling’s ongoing weakness.

If the global ‘boom’ begins to falter UK manufacturers could struggle. Not only that, with the possibility of a hard Brexit looking more likely, they could also be facing disruption to both their supply chains and future orders, especially if they don’t know what trading rules will look like next year.

Certainty for any business is critical and if the uncertainty around Brexit persists, then that slowdown could trigger further falls in investment and we could see a buoyant sector losing its way.

Neil Tyler
Editor, New Electronics
The Building Blocks for Your Next Innovation

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According to technology industry researcher Gartner, the number of things in the Internet of Things increases by 5.5 million each day, which means that by 2020, the total number is expected to be almost 21 billion. Given that explosive growth, it’s imperative to examine the internet that will connect and enable communication among all the things.

Creating reliable wireless connectivity among these devices is proving to be one of the great challenges in IoT. The reliability of the communications system can be defined by the performance of two critical components: a radio transceiver and communications microcontroller.

How can components and solutions help maximise system-level reliability, enabling high impact applications where the quality, integrity of data, and insights are mission critical?

**Not good enough**
Existing wireless connectivity technologies for consumer devices do not always satisfy the performance demands of industrial and healthcare systems. The different priorities in these systems – including safety, accuracy, and time sensitivity – heighten the need for increased reliability. Cellular systems come close to this but are often unsuitable in terms of battery, cost, and data throughput requirements. Extremely reliable systems exist today for niche industrial and military applications. However, these are designed with reliability being the top priority, and cost appearing further down the list.

With the industrial IoT, the challenge becomes about delivering the same high level of reliability at a much lower system cost.

Let’s consider some scenarios where wireless capability has been added to enhance the effectiveness of a system, and where reliability of connectivity can be mission critical.

**Production process control**
A key attraction of connected devices in manufacturing includes the potential for yield improvements. To achieve this, it is often necessary to gain remote control of various devices in the production chain to implement adjustments. An example is a control valve for a boiler operating in a chemical production process.

Immediate, autonomous control of this...
valve can make real-time adjustments, based on feedback from other stages in the process, leading to more optimised overall efficiency.

**Vital signs monitoring**
Hospitals and care centres are looking to wireless connectivity to monitor patient vital signs. Clunky wired solutions can be replaced with wireless sensor patches connected through a local gateway. Such systems enable more effective patient monitoring while reducing the burden on healthcare staff.

**Event sensing**
With advanced image and acoustic sensing and processing methods, systems mounted in public spaces, such as on lamp posts, can detect events such as vehicle accidents and criminal activity with a high degree of confidence. This information can be relayed via wireless communications to the appropriate agency or unit, along with the location information to enable faster emergency response.

**RF obstacles**
Each of the examples previously mentioned are subject to distinct environmental challenges that can negatively impact wireless communication. The steel construction and thick walls of factories create large obstacles that can degrade the power of an RF signal to the point where it cannot be received by the target device. The receiver sensitivity of the radio used in the target device will determine how much signal degradation can be tolerated.

As little as 2dB change in sensitivity could be the difference between the successful or unsuccessful reception of a signal.

Communication system designers must pay close attention to receiver sensitivity when selecting a radio.

**Crowded frequency bands**
Connected devices will typically operate in the relevant ISM band for that region. ISM bands are license free and can be used for a wide range of applications requiring wireless connectivity. 2.4GHz is standardised globally and is widely used by Wi-Fi and Bluetooth devices.

There is also ISM spectrum available in sub-1GHz bands. These bands are commonly used for IoT applications. The band is centred at 868 MHz in Europe and 915 MHz in the U.S.

A challenge arises when multiple devices located in close proximity are sharing the same ISM band. Transmitting devices can interfere with nearby receiving devices, such as in public hospitals, where there are a wide variety of machines sharing the same ISM band. The ability of a radio to operate in the presence of such interferers is measured by the blocking specification.

The challenge extends beyond devices operating within the ISM band. Without sufficient blocking capability, mobile phones or tablets operating nearby could cause a loss of communication in the system.

In military and aerospace applications, very costly components are used to mitigate the effect of interferers. Radios being used for mission critical data, such as the applications previously mentioned, must achieve similar performance to military and aerospace without incurring the high cost of additional external components. Such radios will continue to receive messages with multiple interferers operating nearby.

**Environmental effects**
Radio transceivers are built on processes that are prone to variations in performance, depending on the environment in which they're operating. Some variations include temperature changes, voltage supply reductions as batteries discharge, and silicon manufacturing variations across devices.

These real-life events can cause changes in the operating stability of the device. Let's look at an event sensing emergency response system operating on a street light.

Cold winter temperatures could cause the output power of a device to vary or the receiver sensitivity to degrade. This can cause loss of communication under certain conditions. While this is less of a concern for a consumer device, which is rarely used in such extreme conditions, it would be unacceptable for an emergency response system. At best, the cost is reputational damage to the end product and a service call to replace the faulty device.

System designers must ensure that the components selected for the sensing and communication system are robust over changing environmental conditions.

**Corrupted memory**
Reliability is also a concern on the communications microcontroller. Although extremely reliable, both flash and non-volatile memory can occasionally become corrupted. This can occur because of unintended effects caused by the operating environment or intentionally through malicious hardware hacking.

Regardless of the mechanism, it is imperative that microcontrollers are equipped with the necessary integrity features to identify when a device has been corrupted. Once identified, the microcontroller can either correct
the error or shut the device down, appropriately ensuring that the security of the wider system is not breached.

**Designing for reliability**

Analog Devices has been designing solutions for over 50 years that deal with these challenges. The requirement of hyper robust systems for industrial IoT is not a new one. The ADF7030-1 ultralow power, sub-GHz ISM band radio and ADuCM3029 Cortex-M3 microcontroller, target performance levels and functionality features that enable the most robust communication links.

The ADF7030-1 is the industry’s leading radio for receiver sensitivity performance. In many cases, the ADF7030-1 is capable of receiving radio signals 3dB below the power of other radios. This means signal strengths of less than half the power of its competitor can still be received.

With industry-leading blocking numbers in excess of 100dB, the ADF7030-1 can achieve a level of interference resilience comparable to military and aerospace equipment, without the need for additional costly external components. This increases value and ensures communication is maintained in the noisiest RF environments.

Through generations of collaboration with leading industrial manufacturers, Analog Devices has developed methods for coping with real life environmental effects on radio transceivers. As an example, the output power transmitted by a device using the ADF7030-1 varies by less than 0.2dB over the full temperature operating range.

**Competing radios**

The ADuCM3029 is designed with flash and ECC parity checks to ensure errors due to memory corruption are identified and corrected where possible. The ADuCM3029 is also equipped with battery monitoring capability in sleep mode.

This ensures that unexpected drops in voltage can be detected and the processor alerted to a possible malicious threat or power supply malfunction. The end device can then take appropriate action by either alerting an administrator or entering a safe mode to ensure the wider system is not compromised.

Technologies inhabit every stage of the IoT signal chain from sensing and measuring, to interpreting and connecting the data. Ensuring the quality and integrity of the information created through this chain is a core design principle and is a fundamental requirement to full-fill the true potential of the IoT.
Many electronic products today must operate under significant environmental stress for countless hours. Printed circuit board (PCB) designers now realise the importance of capturing the physical constraints and fatigue issues for a design before manufacturing to reduce board failure and improve product quality.

Today's products must overcome performance in rugged environments, so vibration and acceleration simulation must be included in the product development process. Adding virtual vibration and acceleration simulation during layout will achieve: reduced design iterations and time-to-market; a less expensive product; the ability to simulate all designs vs. just high-risk designs; and increased reliability and prevent potential failures. By running virtual simulation on every board during layout, engineers and designers can detect issues early in the product development process to ensure design quality, decrease time-to-market and mitigate product risks.

To address this issue, Mentor has developed the industry's first PCB design-specific vibration and acceleration simulation tool to remove the cost and time barriers for electronic systems designs that must perform under harsh environments. This new vibration simulation methodology for PCB design reliability and failure prediction augments mechanical analysis and physical testing with virtual accelerated lifecycle testing much earlier in the design process. It increases test coverage and shortened design cycles to ensure product reliability for military, aerospace, automotive and industrial markets.

Its easy-to-use, automated design environment leverages a finite-elements engine for quick, accurate analyses. Unlike other tools, Xpedition is optimised for the PCB layout designer, enabling desktop simulation and redesign. With the industry’s most extensive component modelling library (over 4,000 unique 3D solid models), it creates highly defined parts for simulation. The ultra-fast system modelling tool creates over 1,000 components per minute, and users can assemble the parts models on board and automatically mesh them for performance analysis, including stiffeners and mechanical parts. The simulation Wizard provides fast and accurate virtual prototyping so users can see high-failure-probability components and analyse boundary conditions, material properties, and environment profiles.

Figure 1. Vibration simulation provides information on stress intensity, deformation intensity, failure frequencies, and vibration-deformed shapes

Figure 2. Simulation results should be available in a two-phase post-processor for each simulation, providing broad input on the PCB’s behavior under the defined conditions

Mentor, a Siemens Business, is a technology leader in electronic design automation (EDA), provides software and hardware design solutions that enable companies to develop better electronic and mechanical products faster and more cost-effectively.

The company offers innovative products and solutions that help engineers overcome the design challenges they face in the increasingly complex worlds of board and chip design.

Mentor, a Siemens Business has the broadest industry portfolio of best-in-class products and is the only EDA company with an embedded software solution.

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Mentor, a Siemens Business
Rivergate
Newbury Business Park
London Road
Berkshire
RG14 2QB
tel: +44 (0)1635 611411

www.mentor.com
In 2008, the European Commission initiated a public consultation on existing requirements covering medical devices, which produced more than 200 comments and proposals for change from a wide variety of stakeholders. As a result, the European Commission released in 2012 its plan to restructure the EU’s medical device regulatory framework, along with a regulation that would replace existing directives for medical devices and active implantable medical devices.

This means that manufacturers of medical devices who sell within the European Union (EU) will soon face major changes in the EU’s decades-old regulatory framework, as the Medical Device Regulation (MDR) was officially published on 5 May 2017 and came into force on 25 May 2017. The MDR will replace the EU’s current Medical Device Directive (93/42/EEC) and the EU’s Directive on active implantable medical devices (90/385/EEC).

Manufacturers of currently approved medical devices will have a transition time of three years.
until May 26th 2020 to meet the requirements of the MDR. For certain devices this transition period can be extended until 26 May 2024. However, special requirements must be met to be grant the extension.

**The changes**
The MDR differs in several important ways from the EU’s current directives for medical devices and active implantable medical devices. Changes in the regulation include expansion of the scope of products covered, more rigorous requirements for clinical evaluation including changes to clinical investigations, mandatory unique device identification (UDI) mechanisms, and increased post-market oversight by EU Notified Bodies.

**Specific changes include:**

**Product scope expansion** – the definition of medical devices and active implantable medical devices covered under the MDR is expected to be significantly expanded to include devices that may not have a medical intended purpose, such as coloured contact lenses and cosmetic implant devices and materials. Also for inclusion within the scope of the regulation are devices designed for the purpose of “prediction” of a disease or other health condition.

**Reclassification of devices according to risk, contact duration and invasiveness** – the MDR will require device manufacturers to review the updated classification rules and update their technical documentation accordingly by considering the fact that class III and implantable devices will have higher clinical requirements and a regular scrutiny process.

It is expected that device manufacturers will also be required to collect and retain post-market clinical data as part of the ongoing assessment of potential safety risks. These changes will result in a dramatic increase in the time and resources needed by manufacturers to conduct the required studies and to maintain post-market documentation.

**More rigorous clinical evidence for class III and implantable medical devices** - manufacturers will need to conduct clinical investigations in case they do not have sufficient clinical evidence to support the claims done on both safety and performance of a dedicated device.

**Systematic clinical evaluation of Class IIa and Class IIb medical devices** – manufacturers will need to re-prepare their clinical evaluations by considering the new wording of the regulation on equivalence approach and under which circumstances it is possible to justify not conducting a clinical investigation.

**Identification of “qualified person”** – device manufacturers will be required to identify at least one person within their organisation...
who is ultimately responsible for all aspects of compliance with the requirements of the new MDR. The organisation must document the specific qualifications of this individual relative to the required tasks. Further, qualifications of responsible persons will be subject to review by Notified Bodies to ensure requisite knowledge and skill.

Implementation of unique device identification – the MDR mandates the use of unique device identification (UDI) mechanisms. This requirement is expected to increase the ability of manufacturers and authorities to trace specific devices through the supply chain, and to facilitate the prompt and efficient recall of medical devices that have been found to present a safety risk.

To support this effort, the European Databank on Medical Devices (Eudamed) is expected to be expanded to provide more efficient access to information on approved medical devices.

Rigorous post-market oversight – the MDR will grant Notified Bodies increased post-market surveillance authority. Unannounced audits, along with product sample checks and product testing will strengthen the EU’s enforcement regime and help to reduce risks from unsafe devices. Annual safety and performance reporting by device manufacturers will also be required in many cases.

Specifications – the MDR will give the EU Commission or expert panels the authority to publish Common Specifications. These Common Specifications would exist in parallel to the Harmonised Standards and will be seen as State of the Art, and would be considered as part of the evaluation process by Notified Bodies.

No “grandfathering” provisions – under the MDR, all currently approved devices must be recertified in accordance with the new requirements. Manufacturers with currently approved devices will have three years to demonstrate compliance with the MDR’s new requirements. Exemptions are under negotiation right now.

How you can prepare?

It is important to note that, as an EU regulation, the MDR will have the force of law throughout the EU after the date of application. This approach will eliminate country-by-country interpretations of the requirements permitted under current directives and is also likely to speed up the actual effective date of the MDR’s requirements across the EU.

The complex development process for medical devices, combined with the changes, are likely to make the transition period a complicated and time-consuming process for most device manufacturers.

Because of these complexities, medical device manufacturers are well-advised to stay current on the progress of the MDR through the regulatory approval process, as well as additional changes that may impact them.

In addition, since a large number of medical devices are expected to require Notified Body review and approval, delays in the review and approval process by Notified Body should be expected. Manufacturers of currently approved devices are therefore advised to evaluate potential compliance issues and to develop a plan to address them promptly, if they want their products to remain on the EU market. Advanced preparation and early action will be key to ensuring a smooth transition to the new requirements.

About TÜV SÜD Product Service www.tuv-sud.co.uk

TÜV SÜD Product Service is one of the world’s leading experts in product testing and certification, with 150,000 product certificates in circulation globally. TÜV SÜD Product Service analyses over 20,000 products each year in Europe, Asia-Pacific and the Americas, ensuring that products are safe, reliable and compliant and minimising liability risks for manufacturers, importers and retailers.

TÜV SÜD Product Service’s Machinery Safety Division is the UK market leader in machinery safety, providing a range of services on a world-wide basis. It is also the official partner of the Process and Packaging Machinery Association on regulatory affairs.

TÜV SÜD Product Service’s sister company, TÜV SÜD BABT, is the world’s leading radio and telecommunications certification body, and is a Notified Body under the European Union’s Marine Equipment, Radio Equipment and Machinery Directives.

Author details:

Richard Poate is Senior Manager at TÜV SÜD Product Service, a global product testing and certification organisation, and at its sister company, TÜV SÜD BABT, the world’s leading radio and telecommunications certification body.
Interconnection

Design flexibility

New IEC appliance outlet now provides status indication

SCHURTER’s 6610 series appliance outlet according to IEC 60320-2-2, Style F, is now available with an integrated light pipe. The fiberglass light pipe indicates operational status, or other function status, as an optional feature to standard connectors. It is designed to channel light from LEDs on the PCB board to the front of the connector.

The new technology offers flexible design options including the number of light pipes, 1-4, as well as options for light pipe lengths and diameters. The flexibility of design allows for efficient customer-specific solutions, while enabling increased opportunity to signal status information from the power grid to the user.

Using intelligence efficiently

A typical application consists of power distribution units used in data centres. Today, these units are most likely to have monitoring systems with indicating display panels or controls. These display panels are often centrally located. With SCHURTER’s new appliance outlet, it becomes easier to extend the systems monitoring capabilities from the centralised display to each outlet. Service technicians can clearly see which systems are working properly or respond to required maintenance adjustments. A connector could, for example, signal an outage with a red LED, or a critical power consumption pattern with a yellow LED. In this way, both repairs and preventive maintenance can be done more simply and efficiently.

The integration of the light pipe into the appliance outlet brings about multiple advantages. For one, the many types and number of light pipes available make it possible to completely individualise circuitry that assigns unambiguous signals to each outlet, potentially each corner of the outlet. There’s also the potential for substantial space and cost savings. The indicating light is located as close as possible to the outlet, instead of discretely mounted nearby the outlet, thus leading to a reduction in the strip size altogether or increasing much needed space to add outlets to the strip. There’s also an overall cost reduction that results from integrating the light indication into the outlet, whereby the need for drilling separate holes and other associated logistical and manufacturing steps are reduced or eliminated.

Efficient assembly and safety

In addition to the special benefits that appliance outlets with integrated light pipes offer, you should also consider the advantages of SCHURTER’s connector range overall.

The series 6610 appliance outlet, for instance, has insulation displacement connector terminals (IDC). The outlets can be wired in banks L, N & E or N & E with the L wired independently. The two, or three, conductors can be pressed simultaneously in the IDC terminals. The cover remains locked, providing equal protection of the contacts, while at the same time making the wiring and hence assembly more efficient and cost-effective.
Products in Focus | Retrospective digitalisation

Making the most of legacy equipment

Nick Boughton explains how plants with legacy equipment can retrospectively upgrade their facility to a smart factory.

According to the Annual Manufacturing Report, 2018, four in five manufacturers believe that smart factory technologies will improve their supply chain relationships. The proposed benefits of data collection from smart sensors are huge, but some manufacturers still feel that a smart factory is out of their reach.

Plants across a wide range of industry sectors worldwide contain an abundance of legacy equipment. Particularly in industries with high turnover of low margin products, such as many food and beverage, plant managers may not perceive themselves to have the budget to upgrade equipment, or the time to shut down a section of the production line for installation.

The legacy equipment that remains can cause a multitude of issues, including lack of service and support from manufacturers and an increased risk of breakdown as equipment ages. Each of these are complicated by obsolescent equipment and difficulty getting hold of the parts needed for repair.

However, in many plants these risks are well managed and so the equipment, alongside its related historical data, is essential.

Being smart

Plant managers may accept that machinery can’t be upgraded, but this does not mean they shouldn’t explore the benefits of the smart factory and connected technology, including predictive maintenance, productivity improvements and quality control.

The aging legacy equipment was likely not built with connectivity in mind and there is simply no way to connect it to the existing industrial network. Despite making financial investments when purchasing equipment, there is no reason to believe you can’t upgrade a plant to make it more intelligent.

Retrofit

A wide range of industrial automation suppliers are now offering add on solutions that can provide these benefits. A ‘black box’, which can be installed alongside existing, isolated, equipment can integrate it with the network, allowing the box to read and communicate data from the machine without any changes to existing hardware or software.

In addition, software within the system can allow for visualisation of performance metrics, making it easy for plant managers to identify targets for improvements allowing the system to run more efficiently.

Although each box is different, the overall concept remains the same. A controller collects runtime data via I/O or fieldbus protocols before using software to process it with no need for changes to existing equipment or analysis. This allows for easier and more in-depth monitoring of processes as well as energy consumption. Collating the data from multiple pieces of equipment gives an overall interactive visual of the plant, allowing for real time monitoring.

This can also be integrated with a predictive maintenance schedule, as the data produced highlights potential breakdowns before they happen. For example, a conveyer which is becoming less efficient over time could have a motor that has worn or could require a lubricant change.

Concerns

The analysis, collection and visualisation software required for these applications can be expensive to purchase outright. Allowing plant managers to use their machines as a service, rather than buying each package individually, is becoming more popular. Because the services are integrated, life cycle management and software updates with enhanced features and security updates are combined as part of the service subscription.

With the wide range of options already available, it can be difficult to know which retrofitting solution would fit your plant best and how to overcome any compatibility issues that might arise. For complex systems, expert advice from an independent systems integrator such as Boulting Technology is advised. Choosing the correct option for your plant, process and systems is essential to achieving a wide range of benefits including better supply chain relationships, which four out of five manufacturers believe is possible.
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