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Dear Readers,

Being an industry actor in this period of uncertainty is no easy task. Same for complying with the sanitary rules for the essential personnel to the functioning of the production lines is not easy.

Everyone focuses on teleworking, but this gets complicated in industry, as soon as it is necessary to keep producing and intervene at customer's places. However, the adaptability of companies is remarkable and managers, like all staff, are mostly open to setting up new organizations.

In addition to current constraints, we must move towards new digital technologies such as **Cloud**, **Machine Learning**, or blockchain to stay in the competition. According to several studies, it would seem that European companies are fully aware of the need to integrate these technologies to meet ecological challenges and those of the circular economy. This is part of a further twin transition. A major reflection is launched around the blockchain to improve the complete management of raw materials, its production lines, and the overall and organizational logistics of all of its production methods.

The **investments** are heavy and you must not only keep the prospect of staying in the race on your local market, as well as international, but also have real objectives of tangible profit to embark on a very profound transformation of the company, towards a connected, optimized and creative industry.

Anis Zenadji

Editor for IEN Europe

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VERSATILE INDUSTRIAL 5G ROUTER

GbE ports, PoE, GPS, WLAN, IO, and serial ports



The new UR75-500GL router from **ICP Deutschland** comes with a few promises: fast data transmission, being adaptable to customer-specific applications and having an expandable design. It is a fast device due to

the 5G cellular network, expandable due to its interface diversity and customizable due to the integrated embedded Python app manager. The router is equipped with a Qualcomm four-core ARM Cortex-A7 with 716.8MHz clock frequency. 512MB DDR3 RAM and 8GB Flash memory are installed as standard. A networking capability of multiple cellular networks through the two mini-SIM card slots is also present. In addition, the UR75-500GL offers five 10/100/1000 Mbps network interfaces, 802.11 a/b/g/n/ac WLAN, GPS modem, one serial RS-232 and one RS-485 interface, as well as galvanically isolated digital input and output. It can be equipped with Power over Ethernet functionality, additional memory cards, and equipped with a 4G LTE modem or two RS-485 serial ports. The router provides an embedded Python app manager. Thus, it is made simple to turn a router into an intelligent IoT device for edge computing to process its local data and transfer it to the desired location. The IP30 metal case size 135x118x45mm can be easily mounted on a DIN rail or directly on the wall. The UR75-500GL shows its full performance in a temperature range from -40°C to 60°C. The maximum operating temperature is 70°C. The UR75-500GL is easily configured via the web GUI.

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Robotics Interoperability: a solution to the communication issues of diverse mobile robot fleets

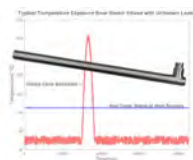
Meili Robots. As robotic fleets become more diverse and autonomous in both industrial settings and public spaces, it is now more important than ever to raise awareness of the wide variety of issues that can arise due to the lack of interoperability. Along with increased robotics implementation and automation comes an extended focus on a number of technologies — such as artificial intelligence, machine learning, Industry 4.0 — which will continue to drive the robotics market growth. This report covers the trends that are currently shaping the market, how certain technologies are influencing the robotics industry, how robotic fleets are becoming more diverse and autonomous, and what role interoperability plays in all this. Meili Robots has created this report to explore the robotics market, highlight the pain points of robotic fleets becoming more diverse, and propose a universal solution as interoperability issues seem to be arising more frequently across industries.



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HIGH-TEMPERATURE LVDT POSITION SENSORS

Operate in fluctuating temperatures from -54°C to 204°C



The High-Temperature HATR-750 Series of LVDT Position Sensors from **NewTek Sensor Solutions** offers a reliable and long-term solution to sensors that fail when operating in environments with unanticipated temperature spikes. For example, steam

valves in power generation plants can have undetected leaks when moving, causing periodic rises in temperatures beyond original operating specifications. When failing sensors are retrofit with a HATR-750 Higher Temperature LVDT, the problem goes away and operators get a reliable output of valve position. Hermetically sealed and constructed of 0.75" diameter stainless steel, these AC-operated LVDTs operate in fluctuating temperatures from -65°F to 400°F (-54°C to 204°C) with excellent linearity, high sensitivity and infinite resolution. Windings are potted inside the hermetically-sealed housing with epoxy for added protection against the conditions caused by harsh environments. Units also withstand shock and vibration for a consistent and reliable output. Available in measurement ranges of ± 0.05 inch (1.27mm) to ± 10 inches (250mm), the HATR-750 Series Sensors are ideal for a range of industrial applications such as machine components, workpiece or valve position sensing in factory automation, assembly and power generation plants with corrosive environments. An electrical connection made through a radially-mounted connector reduces housing length so units can fit into tight spaces.

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New current sensor element and firmware



Yokogawa has launched a new Current Sensor Element and upgraded the firmware for its WT5000 Precision Power Analyzer. The enhancements are designed to help companies improve performance when developing or evaluating electronic devices such as Electric Vehicle (EV) related equipment or systems for solar and wind power installations. The new Current Sensor Element runs off the internal DC power supply of the WT5000, making external power supplies unnecessary. This makes set up for measurements easier as the only things required are the current sensor and a connecting cable. Three sensor connection cable lengths are available - 3 m, 5 m and 10 m. The new Current Sensor Element also improves noise immunity with a low noise power supply and measurement circuit. In the new modules, shunt resistors are built-in and are included in the shielding in the instrument, increasing noise immunity. A step-by-step navigation menu simplifies the configuration and use of the current sensors. Firmware is also upgraded, with the Data Streaming function now supporting a 50 ms to one second update rate, giving a better insight into the dynamic behavior of the device under test. The upgraded firmware now also offers a 10 ms update rate. Other upgrades include improvements to the menu such as Current Phase Correction and Amplitude Correction, which makes setting up external sensors easier by compensating for the phase and gain error.

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ICS Cool Energy Keeps Leading UK Brewery Operations Cool

ICS Cool Energy, an international market leader specializing in complete temperature control solutions for manufacturing process and facilities applications, has helped a leading multinational brewery in Burton-on-Trent to fulfil their cold storage and process cooling needs. The brewery was looking for a partner that could answer their unique needs for cold storage within their Burton-on-Trent plant and replace the aging, ammonia-based process cooling system. ICS Cool Energy team was able to deliver a bespoke, long-term hire solution that met all their requirements. The brewery was looking for a way to install a flexible cold storage solution that would keep the kegs of beer and raw products cold and fresh within their craft beer pilot plant. They needed to maintain specific temperatures to guarantee product consistency, while coping with a high ambient temperature caused by the central location of the pilot plant within the manufacturing facility. ICS Cool Energy was able to tick all their boxes customizing a 20-foot refrigerated container unit as part of their Cold Store hire solutions.



AESSEAL® Wins Another Queen's Award for Enterprise for Innovation

This is the 12th Queen's Award received by **AESSEAL** plc and the 14th for the AES Engineering Ltd. Group. The Short Canister Mixer Seal which is the subject of the latest award is the world's first Zone 0, 1 and 2 range certified mixer seal, based on a modular platform and is capable of sealing the most difficult applications in the world by design.



AESSEAL® is the last remaining UK manufacturer of a full line of mechanical seals after their largest competitor moved its UK manufacturing base to the Czech Republic a decade ago.

As pharmaceutical products cannot tolerate any contamination into the Mixer or Reactor seal vessel, an inert gas is often the preferred choice of barrier fluid. By design **AESSEAL®** always intended to add an internal and external gas lift version to its Short Canister Mixer Seal and, continuing the company's relentless pursuit of excellence, it will be introducing a full range of Zone 1 and Zone 2 certified gas lift seals, suitable for use in the production of vaccines, on the 1st of June 2021.

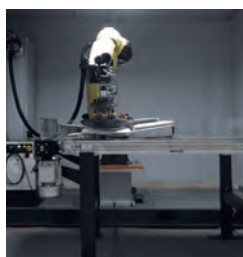
Pump & Valve Innovator Finds a Test Rig Technology that Talks the Torque

To analyze the long-term performance and reliability of hard-working valves and pumps, Bifold Group has adopted radio frequency-based torque transducers from **Sensor Technology Ltd** for two of its specialist test rigs. By using the power of computer aided design, many of Bifold's products are built to custom designs, yet they are produced to very short lead times thanks to the efficiency of internet communications. To maintain this standard, sample products and components are comprehensively tested so that their reliability and capabilities are never in doubt. When Bifold wanted to assess the effects of wear on its long-life valves, it set about designing a special test rig. TorqSense transducers lend themselves to test rig uses because they are non-contact measuring devices.



Fizyr and AWL Enter into Collaboration

In a dynamic market, flexible automation solutions are of crucial importance. The logistics market has already advanced in automating transport, but there is still a lot to be gained using robots for material handling. **Fizyr** and **AWL** have entered into a strategic partnership to offer high-end robotic solutions, especially for the logistics market. As an independent system integrator, AWL works together with various suppliers of robots, vacuum technology, and vision software, among other things. By integrating the Artificial Intelligence-based vision software of Fizyr into machines, AWL makes automated picking in harsh logistics environments possible. AWL uses its picking competencies for the postal and parcel industry and e-commerce, among others. They provide a complete solution capable of identifying the picking points of randomly oriented unknown items in totes or conveyors through advanced vision technology. Thanks to this technology, the robot receives the order to pick and process the item. The collaboration with Fizyr has resulted in improving AWL's existing automatic picking solutions.



New Opaque Colors and Graphic Sharpness for PolyJet™ 3D Printers

Stratasys aims at setting the standard for full-color multi-material 3D printing, through new materials for PolyJet™ 3D printers. The addition of new VeroUltra™ White and VeroUltra™ Black materials deliver a consequent realism boost and graphic sharpness for opaque materials for a broad range of prototyping projects. The materials simulate high-quality opaque plastic parts, even when they are very thin. Text and labels on bottles and packaging are sharp enough to meet 2D graphic standards. Color contrast is enhanced where high color separation is expected. Stratasys has introduced PANTONE® Validated colors, thus the colors in hand match the colors on the screen. Materials like VeroUltra Clear have introduced properties like glass-like clarity or flexibility. Software formats like 3MF have streamlined the workflow so high-fidelity modeling takes little more than just click and print. The new opaque color materials are available now for the J8 Series™ and J7 Series™ 3D printers and in June for the J55™ 3D printer.



Installation of a New Trolley Assist Solution to Reach Sustainable Development Targets

With this order, **ABB** confirms its presence on the path to all-electric mining. Copper Mountain Mining's flagship conventional open pit, truck and shovel operation produces approximately 100 million pounds (45,000 metric tons) of copper equivalent per year. The initial phase of the trolley-assisted system is scheduled for late 2021 and should result in a reduction of more than 50% in 5-7 years with the ultimate goal of achieving zero emissions by 2035. The planned installation includes engineering, supply and construction management of a DC substation and an overhead catenary system (OCS) and combines ABB's electrification and automation expertise in the mining industry. The trolley control system can bring connectivity to the existing distributed control system (DCS) automation platform for harmonious integration and monitoring of trolley operations and energy consumption. ABB works with many mining companies and has already installed a similar substation at Bliden AB's Aitik mine in Sweden, including a 4.8-megawatt rectifier, connected to the ABB Ability™ System 800xA DCS.



Differential Centrifugal Sedimentation: A Valuable Technique for Characterization of Small Nanoparticles

Analytik Ltd reported how researchers from the University College Dublin, the University of Salford and the Royal College of Surgeons have employed a DC24000 ultra-high resolution particle size analyzer for the physicochemical characterization of small nanoparticles, particularly for the analysis of the particles in the presence of complex biological fluids. These nanomaterials allow for better tissue penetration, less accumulation in the liver and more efficient renal clearance to reduce non-specific accumulation and off-target effects than larger particles.



If small nanoparticles have been currently so little exploited, it is because of their physicochemical characterization remained difficult. The techniques commonly used for the characterization of small nanoparticles after bioconjugation, such as Dynamic Light Scattering (DLS) and Nanoparticle Tracking Analysis (NTA), struggle in analyzing these difficult materials, mainly because of their detection limits. For other techniques, such as Fluorescence Correlation Spectroscopy (FCS) or Agarose Gel Electrophoresis (AGE), it is the specific properties of the particles that are problematic, such as fluorescence, which makes it impossible to apply to all types of nanoparticles.

PTC Leverages Spatial Computing Capabilities with Vuforia Engine Area Targets

PTC announced the newest addition to its Vuforia augmented reality (AR) enterprise platform, the Vuforia Engine Area Targets. It is the first offering to support the creation of immersive AR experiences for spaces up to 300,000 square feet. Through the use of Area Targets, industrial organizations can create AR interfaces within their facilities to enable employees to better engage with machinery and understand how the environment is being utilized. With support from Matterport and Leica 3D scanners, along with NavVis's indoor mobile mapping systems, Area Targets users can generate photorealistic, survey-grade digital twins, empowering them to create digital canvases of spaces such as factories, malls, or offices for advanced spatial computing applications.



How Thinking Wireless can Overcome Mission Critical Sensing Challenges in Industrial Applications

Wireless sensors are offering design engineers reliable ways of detecting vibration, heat, and other potentially damaging faults, including loss of pressure, in some of the most challenging industrial applications, however remote

Sensata Technologies. Conventional hard-wired solutions are not always convenient, or practical, which has accelerated the development of wireless solutions. Wireless devices are quick and easy to install, without the need for expensive cabling, and bring solutions to applications that previously might not have been possible. Whereas early wireless systems presented challenges with reliability and performance, often associated with battery life, these challenges have long since been overcome with products whose integrity is no longer in doubt. And they are being deployed to resolve a diverse range of mission-critical challenges across an equally diverse range of industrial applications.

Production efficiency

Take, for example, the case of a well-known automotive manufacturer, renowned for its high performance and luxury cars. Cost efficiency is maintained by having a production line that is 'always on'. Put another way, any unintended interruption can be expensive. So when this particular manufacturer had a problem with the machinery that moves the chassis down the line, it had to act fast. The motors were failing, bringing the line to a complete halt. An investigation was launched to discover the root cause of the problem. Vibration may have been the reason, but it did not give the whole answer as to why the high-resistance joints were failing.



The dashboard illustrated the performance of every motor on the line, in real time, and was colour coded so the production manager had total visibility of any potential issues. Red indicated that urgent action was immediately required as the motor was on the point of failing; amber signalled that a motor was struggling, and remedial action was needed. Each alarm was linked to the current ambient temperature to reduce the likelihood of false alarms. The implications in terms of improved fault diagnosis and preventative maintenance are obvious, and in this particular application, the customer calculated that it saved €2.5 million in production downtime.

Precision monitoring

Another well-known business, a global engine manufacturer, had an altogether different challenge on its manufacturing line involving a hydraulic fixture.

The hydraulic fixture was in effect a clamp (used in preference to a manual clamp) to keep an engine part in place while it was precision tooled. Constant pressure in the clamp was therefore essential as even the slightest movement of the part could lead to a costly mistake and the part

These wireless sensors from Sensata/Cynergy3 are offering design engineers reliable ways of remotely detecting loss of pressure in some of the most challenging industrial proximity or remote applications



Mark Jamson is the global Smart Factory marketing leader of Sensata Technologies. Before that, he managed the Cynergy3 business, which is now part of Sensata Technologies

being cut in the wrong place. A more dangerous scenario could also be imagined in terms of the part breaking loose and the health and safety risk that presented. In this example, three wireless sensors were embedded within the fixture to ensure a constant pressure. A hard-wired system was simply not practical or desired, since the fixture was then rotated at speeds of up to 500rpm. The sensors were integrated such that if any variation in pressure was detected beyond a set threshold then the machine tool would automatically shut down to avoid potential damage to the engine block. In much the same way as in our automotive example, data from each of the sensors was collected and transmitted wirelessly through a gateway and presented on a bespoke dashboard. With zero errors, the installation has been so successful that the solution has now been rolled out to the company's global manufacturing operations.

Remote installations

It is not just in 'traditional' industrial manufacturing environments that wireless sensors are





This dashboard shows the performance of every motor on the production line of an automotive manufacturer in real time. It is color coded, so the production manager has total visibility on any potential issues and can react in a timely manner

demonstrating their value. They are also proving essential in remote installations such as solar farms. Because of the high currents generated and exposure to large temperature and humidity variations, solar farms are particularly prone to fires caused by high resistance joints. As these joints increase in temperature, micro arcing and more advanced arcing may start to occur. In severe cases, arcing may lead to electrical fire, resulting in a safety hazard and damage to expensive equipment.

Typically, high resistance joint connections are monitored periodically by a maintenance team, but this has obvious drawbacks. It means they have to be physically onsite, on locations that are often remote, with all of the associated cost and inefficiency that this brings. Even if such visits are essential, for example for basic maintenance such as panel cleaning and maintaining the external environment, there is usually little or no time to consider the root cause of any motor failure. Although the use

of thermal imaging to look for heat spots is a possibility, this poses health and safety issues which will become more problematic as the market migrates to more dangerous, high voltage (1,500V) systems.

Even if thermal imaging is performed regularly, however, it does not give real time or predictive data. The scarcity of data makes it harder to analyse trends and predict when a joint may fail. This is where wireless monitoring has an essential role to play.

Wireless digital sensors, installed as near to the actual termination as possible, provide real-time access to temperature data from the solar farm terminals. A wireless transmitter is then used to transmit the digital temperature data to the IoT gateway in the same way as previously described. Similarly, a dashboard presents alarms based on the traffic light system which can be linked to SMS or email alerts, notifying the solar farm management team immediately so that they may take corrective

action and avoid failure. Because the data is continuous, trends can be identified over time to determine in advance what causes a motor to fail and how it can be prevented. Predictive maintenance can therefore be planned accordingly with all of the benefits this brings.

Ongoing challenge and trends

However robust the design, motors will continue to fail over time. Vibration, as stated earlier, is a principal cause of failure, alongside poor installation and maintenance. Manufacturers are well-versed in monitoring vibration but, what has more recently changed, is the way that data is captured, stored and analysed; this is where wireless devices have a critical role to play. Because the devices are wireless, they can be installed close to the termination, and the data captured in real time. Analysis is possible at the edge, rather than conducted after the data has been logged back at the PC, as would previously happen. This edge analysis facilitates a more efficient operation, without avoidable interruptions.

Manufacturers like Sensata Technologies, are constantly innovating in this space. Flexibility is the key: in thinking, in product selection, and in not being restricted to a proprietary protocol or software. Being 'solution agnostic' – meaning that a supplier can deliver a range of wired analogue sensors through to wireless digital devices – allows the supplier to propose an appropriate solution which considers each customer's individual requirements.

Mark Jamson,

*Global Segment Marketing Leader,
Smart Factories, Sensata Technologies*

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Measuring the pH Value Simply and Precisely with an Electronic pH Meter

Whether looking for a compact, pocket, portable, handheld or tabletop pH Meter/pH Tester, this application story shows how testing soil pH, water pH, food pH can be done more quickly, easily, and accurately with a digital pH Meter/pH Tester

Among the various ways to determine the pH value, one method is the use of indicator dyes. From litmus paper and other test strips, however, the pH value can usually only be determined roughly as an integer value or across a limited measurement range. In contrast, even simple electronic pH meters show the pH value with two decimal places across the entire range from 0.00 to 14.00.

Reasons for pH measurement

The pH value indicates how acidic or alkaline an aqueous solution is. Everyone knows the term acidic and the effect of vinegar and lemon juice. On the opposite side of the pH scale, above the neutral value of 7.0, there are alkaline bases which include normal soap, bleach, concrete, and caustic soda.

While we are surrounded by many acidic or

alkaline substances every day without feeling it directly, the pH value has a serious influence on the course of many processes. Here are a few examples:

The pH value in humans

For many biochemical processes in the body, complicated processes adjust the pH value to the required range. If the pH value in the blood deviates from the normal values, this is an indication of certain disorders or diseases. The protective acid mantle of the skin with a pH value of 5.5 usually regenerates itself. However, for sensitive skin and frequent use, it is recommended to use washing substances and cosmetics with a skin-neutral pH value.

The right pH value for plants

The pH value of the soil influences the roots' ability to absorb nutrients and trace elements. Most crops require a pH value between 5.7 and 6.5 in medium-heavy soils. The current pH value can be determined with a soil pH meter and adapted to the needs of the respective plants by targeted soil improvement.

The pH value in swimming pools

The pH value can be determined with a pH meter and, if necessary, adjusted by adding certain substances. The value should be adjusted to 6.5 to 7.6 according to DIN 19643. Values between 7.0 and 7.4 are recommended while drinking water may have values between 6.0 and 8.5 and seawater has a pH value between 7.5 and 8.4. The pH value of the pool water is one of the decisive factors for the effectiveness of the disinfectants and maintenance products.



pH measurement in aquarium



The pH Meter PCE-CP 20 from PCE Instruments in use

Selection criteria for pH meters and temperature range

Measurement range, resolution, and accuracy. Almost all electronic pH meters cover a measurement range from 0 to 14 and display the value with two decimal places. The measuring accuracy of good devices can be up to 0.01. Since the pH value is temperature-dependent, it is recommended for most applications to choose a test instrument with automatic temperature compensation (ATC). The user must make sure that the temperature of the samples to be measured is within the range of the temperature compensation.

Calibration and adjustment facility

Simple pH meters only allow linear adjustment of the values to a single calibration value by means of an adjusting screw. More



sophisticated pH meters feature a two- or even three-point adjustment via internal algorithms. These are more suitable when precise values are required.

Electrode selection

Nearly all pH meters work with external probes. These can be easily replaced when they are worn out. For some applications, there are special pH electrodes, for example for penetrating soils or meat. If the pH meter has a BNC socket, any other pH electrode with a BNC connector can be used instead of the original probe.

Additional functions of a pH meter

Some pH meters offer additional functions such as storage of the measured data, interfaces for transferring the saved data or the possibility to measure other values as well. Parameters that can be recorded with an appropriately equipped pH meter include, for example, temperature, conductivity, salinity, the TDS content and redox value.

Broad spectrum for different requirements

PCE Instruments offers a wide range of pH meters for many different areas of application. The portfolio includes products from

first-class manufacturers as well as PCE's own test instruments, which benefit from the experience of two decades. The product range extends from devices for individual measurements in swimming pools to devices for continuous measurement in aquariums and professional devices with a memory function and data interface for use in industry, trade and research. PCE Instruments also offers the necessary calibration and storage solutions and special pH electrodes for various applications.

Ludger Droste - PCE Deutschland GmbH

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Pump and Valve Innovator Finds a Test Rig Technology that Talks the Torque

To analyze the long-term performance and reliability of hard working valves and pumps, Bifold Group has adopted radio frequency based torque transducers from Sensor Technology Ltd for two of its specialist test rigs

An inter-generational commitment to advancing science and engineering has seen Bifold transform from a 19th century mining lamp maker into a leading manufacturer of instrument valves and accessories, piping valves and pumps for the oil, gas and wider industrial markets. It has expertise in subsea and wellhead control systems and has also developed market leading technology in areas such as solenoid valves with ultra-low power requirements. By using the power of computer aided design many of Bifold's products are built to custom designs, yet they are produced to very short lead times thanks to the efficiency of internet communications. To maintain this standard, sample products and components are comprehensively tested so that their reliability and capabilities are never in doubt.

Bifold is as innovative in developing its test regimes as it is in advancing its product technologies and business systems. So when it wanted to assess the effects of wear on its long-life valves it set about designing a special test rig. Engineer Andrew Laverick recalls: "We wanted to measure the power required to operate the valve to see how it changed over time and with

long term use. It was clear that the best way to do this was to measure the torque input over an extended period."

"We were open to any design concept for the test rig, but soon found ourselves gravitating towards a TorqSense solution because the Sensor Technology engineers were so helpful and really knowledgeable about test rigs."

TorqSense transducers lend themselves to test rig uses because they are non-contact measuring devices. Attached to the surface of the transducer shaft are two Surface Acoustic Wave (SAW) devices, when torque is applied to the shaft the SAWs react to the applied strain and change their output. The SAW devices are interrogated wirelessly using an RF couple, which passes the SAW data to and from the electronics inside the body of the transducer. Sensor Technology's Mark Ingham explains: "All you have to do is set up a TorqSense transducer in the test rig and fire it up. The SAW frequencies reflected back are distorted in proportion to the twist in the test piece, which in turn is proportional to the level of torque. We have some clever electronics to analyse the



returning wave and feed out torque values to a computer screen."

"TorqSense has been used on many test rigs over the years and I was delighted to hear the Bifold engineers say how easy it is to use and how robust the software is."

Laverick again: "As a test engineer you are almost resigned to long set up procedures and software that falls over at the drop of a hat. But Sensor Technology has designed these problems out of their TorqSense equipment, with the result that we were able to complete our long-term test procedures with the minimum amount of fuss and heartache and well within the allotted time schedule."

In fact Bifold has since bought a second TorqSense which is being fitted to a new test rig used to assess the performance of mission critical chemical injection pumps, as used at oil and gas wellheads and on process pipelines.

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N° 5 - MAY 2021

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Top 10 Questions to Consider when Selecting a Measurement Sensor

Why do sensor suppliers ask detailed questions when it comes to solving a measurement task? With different measurement technologies and thousands of sensor variants to choose from, the answers to these questions help suppliers decide which sensor is best for the application

When it comes to solving a measurement task, sensor suppliers will often need to ask detailed questions about the application. Whether you need to measure distance, deflection, position, gaps, edges, temperature, surface profile or colour, there will be different measurement technologies and thousands of different sensor variants available to choose from.

By asking detailed questions about the measurement task, a supplier can use these answers to work out which technology and sensor are most appropriate for your application. Here are the top 10 questions you should consider when enquiring about a sensor to solve your measurement task.

1. What are you trying to measure? Can you describe the application? Do you have a drawing?

When you call a supplier, it can often be difficult to imagine exactly what you want to do, especially over the phone. Pictures, drawings and photos can help the supplier to understand the requirement you have.

2. Why is it important to make this measurement? What is the benefit in acquiring the measurement?

Understanding the need of the measurement is crucial. It could be that the supplier ends up recommending a sensor or system over and above

what you first imagined. However, if the implementation of a solution leads to your company saving thousands or tens of thousands of euros or pounds per year, then surely it would still be worth considering?

3. What are the technical requirements? How far can the target move, how fast does it travel and what tolerance needs to be achieved?

Micro-Epsilon's sensors measure displacement – changes in position, thickness, etc.

They also measure temperature and detect/monitor colour. Understanding the boundaries of the measurement helps to identify the possible sensor technologies. Tolerances are probably the most important information you can provide to the supplier, as these ultimately define the real accuracy required in the application.

4. What is the target material and its surface condition?

If a supplier knows they are measuring against metals, plastic, glass, rubber or other materials, this will again help define which sensor technologies could be used. You should also know if the surface appearance changes in terms of its colour, shine, and temperature during the measurement task. Is it rough, smooth or varied, as this will also have an effect on measurement performance?

5. What is the shape, size and movement of the target?

This question is all about the physical aspects of the target. By understanding the geometry, a supplier can establish if the target is large enough for a specific sensor to be used, or if a small sensor spot size is required.

6. How much space is available to mount a sensor? What are the restrictions above, below and around the target?

This can often be overlooked, but if you are trying to fit a sensor into a small space (perhaps it is a retrofit or an upgrade) knowing how much room is available can often influence the type of sensor that can be used. Sometimes it might be possible to move the sensor further away from the target than at first thought and look through apertures or windows.



Micro-Epsilon offers 14 different product technologies and thousands of sensor variants



7. What is the ambient environment for the sensor and target? These can often be different.

Make sure you think about the location of both the sensor head and (if applicable) the controller. Key factors here will be ambient temperature, cleanliness of the environment (e.g. dust, steam or oil), pressure or vacuum, as these can affect measurement performance and sensor accuracy.

8. What quantity is required? Is it a single measurement, multiple measurements on a single target required for multiple machines or a combination of all?

Having just one sensor to measure is easy to integrate. However, if you are measuring multiple positions at the same time then synchronisation and connectivity of the sensor(s) are important factors to consider. What output signal you need is also important (e.g. analogue, digital, fieldbus).

9. Have you defined a budget for solving the measurement task?

An incorrectly specified sensor chosen to meet a budget may just be money wasted if it doesn't measure as required. Before setting a bud-

get, it can be beneficial to talk to the sensor supplier to help determine what a realistic budget should be.

As a supplier, we will always aim to work to your budget, but if that results in a compromised sensor selection, we have to ask is that the best decision for your company over the long term?

10. When do you need a working solution by?

Most catalogue sensors are available from stock, but we also have the ability to customise parts of the sensor specification, for example, providing you with a non-standard measurement range, target specific calibrations, or different cable lengths.

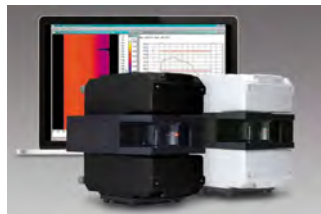
We can even create a bespoke sensor for OEM requirements. However, these can take time and so it is best to talk to the supplier in plenty of time to help enable the right solution is chosen, rather than one which 'fits' into a shorter timescale.

*Glenn Wedgbrow,
Business Development Manager at Micro-Epsilon UK*

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5G Drives mmWave Technology Across Multiple Industries

Many industries benefit or react to shared common technology. The IC supply chain is examined along with how IC supply chains are reacting to these new requirements. This article also demonstrates how mmWave frequencies help to solve today's challenges

The Intertwined World of Wireless Electronics

Industries can often benefit from technology created for a different industry's application. We see this happening today with 5G telecommunications trying to realize the benefits that the defense industry has created with phased array antennas. In the future, it's very likely that the defense industry will, in turn, be able to realize new technologies made possible by the advancements in 5G, creating a cyclical relationship between them.

The cycle of benefitting from a technology that was created for a different purpose has occurred in various markets and will continue for years to come. We will now explore why mmWave frequencies help both defense and communications.

Higher Frequencies Enable Higher Data Rates and Wider Communication Bandwidths

As mobile communications have proliferated over the past 20 years, we've seen an increased demand for higher data rates. The improvements in throughput are often correlated to more sophisticated modulation schemes, which can simultaneously transfer multiple pieces of information. As the modulation schemes become more sophisticated, the ability to transfer more data grows. A common way to modulate a signal is to spread it over a range of frequencies around a carrier frequency. As a result, another way to improve the throughput is to increase the bandwidth of the modulated signal (FBW) by spreading it over a wider frequency range. In order to continuously increase the amount by which we can spread the signal, we need to increase the carrier frequency (FC) as to not extend below dc. This ability to transmit more data simultaneously by moving

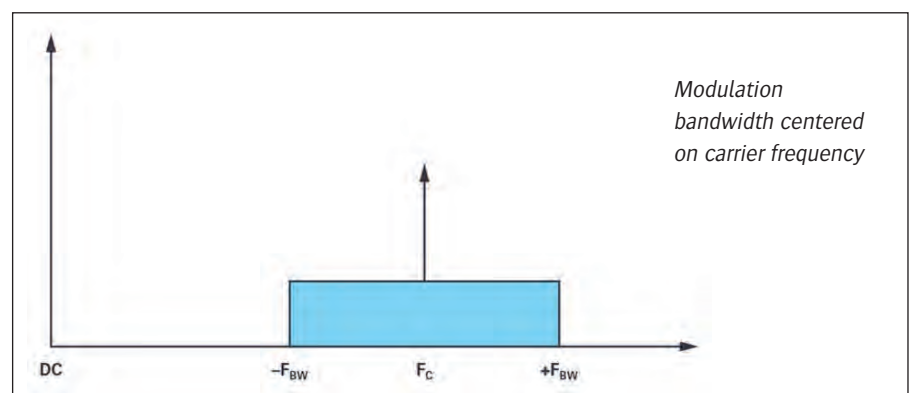
to higher frequencies is pushing applications toward mmWave frequencies.

How Electronic Warfare Is Impacted by 5G

Today's military conflicts are increasingly fought electronically, bringing rise to the idea of electronic warfare. One of its key components is radar, which simply transmits a signal and waits for it to return, mapping the field-of-view of the radar. Radar systems have been developed for over 100 years with the key benefit of detecting and mapping objects that are beyond human visibility. Traditional low frequency radar systems in UHF and VHF frequencies have been used as early detection radar over very long distances. Fast moving aircraft more often operate at X-band frequencies (8 GHz to 12 GHz) that benefit from a higher resolution and smaller antennas. Radar systems used in fighter jets to deploy and target missiles often operate at Ka-band frequencies (33 GHz to 37

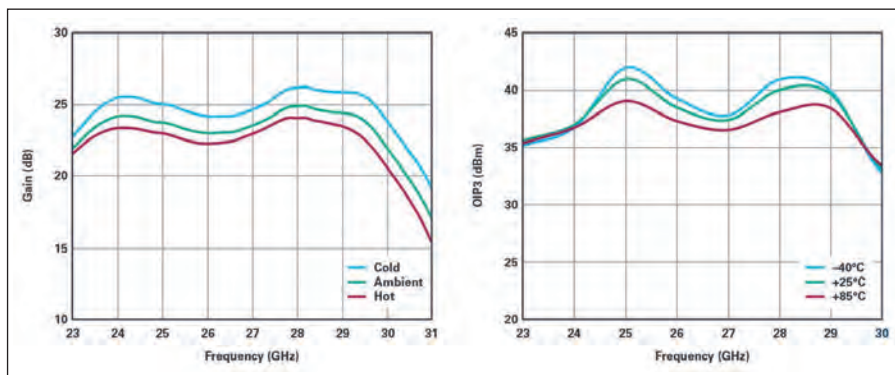
GHz). There is increased development happening at 94 GHz for guided munitions and missiles. There are several benefits in moving to higher frequencies for radar systems and we can see the benefits by looking at the range resolution and angular resolution that help to characterize the ability to resolve an object. The first benefit of moving to higher frequencies is that the size of the antenna shrinks to obtain a given angular resolution, which is the key to fitting into a small munition. Another way to view it is that the angular resolution increases at higher frequencies for a given antenna size. The range resolution of the radar is proportional to the modulation bandwidth and, as previously discussed, improves at higher frequencies. As a result, as applications need higher resolution, there is a benefit in moving to higher frequencies.

A key technology that has been used in defense applications for many years has become



5G IC supply chain





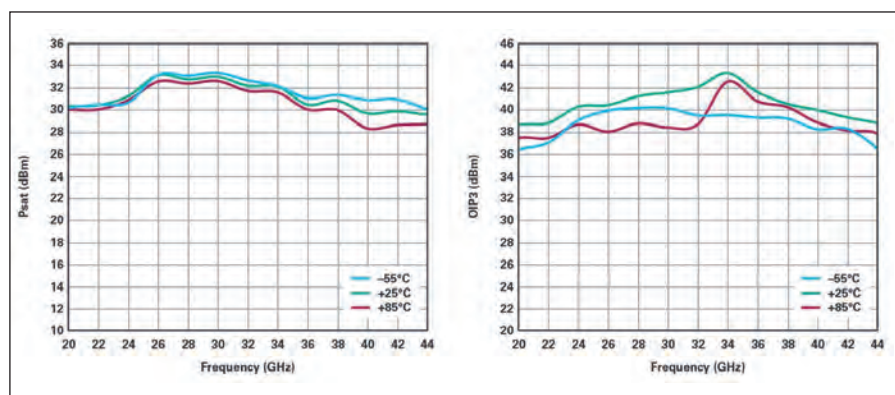
HMC863A measured gain (left) and OIP3 (right) vs. temperature

desirable for 5G telecommunications. Phased array antenna technology is desirable for 5G with several features that the defense industry also finds valuable. Such key attributes include the ability to transmit multiple data streams or radiation patterns. In defense applications, this could allow a fighter jet to track multiple targets at one time, while in 5G telecommunications, it allows them to transmit data to multiple users at one time.

The 5G Effect on ICs

The advanced technology supporting the 5G cellular infrastructure represents a significant growth area for many telecommunications equipment providers and their IC-based supply chain. The core components that make up these systems are the ICs that route the data through the networks. We can see that each aspect of the IC supply chain is adapting and evolving. Starting with the foundry processes available to the final test solutions of those products, we see significant innovation in the technology supporting these products.

The IC design evolves as new process technology becomes available. With new functionality available in one process node, the IC designer is able to combine certain features into one product or extract a higher level of performance from the core transistors than was previously possible. These trends ultimately lead to chips that are more integrated and more easily deployed. Also attractive, as we expand to mmWave frequencies, is the ability to take advantage of low-cost packaging, which enables easier assembly. Increased integration into smaller packages with increased performance makes surface-mount assembly much more attractive.



ADPA7005 measured saturated power (left) and OIP3 (right) vs. temperature

Test solutions such as the over-the-air test have become a reality for phased array antennae and their ICs at 28 GHz and 39 GHz. Nowadays these test solutions are becoming more affordable, smaller, and available off the shelf. Phased array antennas have migrated from a technology that mainly defense companies and universities could explore to one that is becoming mainstream. The result is many more mmWave products available in the industry that can be deployed in communications, as well as in defense applications. Very often the products that are used for cellular infrastructure are close in specification and function to what is required for the defense and instrumentation industry. It's this growth of readily available ICs and test solutions, enabling a fast time to a final product, that is significantly de-escalating the level of threats in the mmWave frequencies for the defense industry.

Analog Devices Helps to Enable Multiple Industries Feeling the 5G Effect

Analog Devices has invested significantly in

developing solutions for 5G telecommunications in addition to the instrumentation and defense industry that will be impacted. The products for the telecommunications market tend to be narrower frequency bands where performance can be optimized more easily. One example of a power amplifier (PA) used in 28 GHz 5G telecommunications infrastructure is the HMC863ALC4, covering 24 GHz to 29.5 GHz and supplying greater than 0.5 W of RF power. The PA is housed in a small 4 mm × 4 mm surface-mount package while generating close to 40 dBm third-order intercept (TOI).

In addition, Analog Devices has developed

solutions for the defense and instrumentation market, such as the ADPA7005, covering 20 GHz to 44 GHz. The ADPA7005 supports over an octave of operational bandwidth and provides a saturated output power of greater than 1 W over the band of operation. A consistent gain of nominally 15 dB across frequency allows for easy integration into a complete system. Additionally, the high TOI of over 40 dBm is ideal for measuring or generating highly modulated input signals.

The advancements in telecommunications networks have generated a reaction in peripheral industries that will unfold in the years to come. At the center of this migration is the need for more information in the form of data that is likely to create new weapons that will never physically strike an object. The applications in today's world are moving higher in frequency and it is only beginning.

Keith Benson, Director,
Amplifier Products – Analog Devices

►► 60755 at www.ien.eu



The Built-in OPC UA Capabilities are a Powerful Addition to the FDT Server

Glenn Schulz, Managing Director at FDT Group, gives us the details of the FDT 3.0 IIoT ecosystem, as well as insights on smart manufacturing and mobility, CIP security enhancements and 5G technology

Can you tell us more about the FDT 3.0 IIoT ecosystem? How can this help optimize next generation automation solutions?

The IIoT ecosystem designation comes because in this architecture we have now placed a server. The FDT server is highly scalable. It fits all the classic IoT requirements and capabilities, and our ecosystem continues to expand. We are, in one sense protocol agnostic. In the larger sense, what this part of the ecosystem means to the end user is that they can remain essentially oblivious to what network of particular devices on when they're talking with, it doesn't matter how many layers deep it is. They are able to directly access that device. And then another part of the ecosystem with FDT 3.0 is all the toolkits and capabilities that we make available for developers, so that basically, they can go to market much quicker with their FDT enabled products.

In terms of the optimization of next generation automation solutions, in the fact that you can access all of the information from FDT, wherever you are, the mobility aspect of it, in consideration of the type of solutions that can be offered with, end users can do optimization around these considerations. For instance, some more senior engineer or senior technician can remotely access information to help a junior person to troubleshoot a problem or to commission a line without having to physically travel into the facility. In the context of COVID-19, it is a pretty important deal.

What kind of contribution does the FDT group brings to smart manufacturing, and mobility?

The FDT group is a standards organization. What we do is providing the underlying capabilities for smart manufacturing and mobility. For example, in the era of smart manufacturing, the world is pretty much standardized on OPC UA, in terms of how we want to access data from different systems to be able to leverage that data elsewhere in the enterprise. The new FDT server architecture includes an OPC UA server. The data is available across the enterprise because of the FDT

standard and is now freely accessible for other uses within that enterprise through OPC UA. For example, you might have a request where a production manager asked for a dashboard to be put together to monitor a new production line. Well, that is trivial if you can immediately get all that information through OPC UA without having to reprogram the PLC or intervene with the DCS because the FDT standard sits side by side at a peer level with the PLC and DCs so it can offer up all of that information to elsewhere in the enterprise without disrupting the control environment. The same is true for mobility: the FDT server, or the user interface can now be accessed through any browser.

A few weeks ago, the ODVA announced CIP Security enhancements to support resource-constrained Ethernet/IP Devices. What does this bring to the FDT 3.0 FITS platform?

It brings more security to the overall solution, obviously. First, I have to compliment the ODVA. I think they are showing the industry what is necessary to develop and enhance a secure communications protocol. We do not have any parallels for that in the industry. CIP security is so important for our industry in general, for us as a standards organization. This means that when we are connecting using these protocols, then we can be ensured of a more completely secure solution. Without that you can have a network that is unsecured that is talking to a highly secured environment like the FDT server. And that is not optimal from a security perspective. So as the ODVA organization continues to ratchet up the security that they make available through CIP security, this is only going to benefit the industry and FDT enabled solutions as a result.

In this critical time of the pandemic, how can your solutions give a hand to companies working with reduced staff or remotely? For example, how can the FITS standard can help them?

The new FDT server features an internal web



Glenn Schulz, Managing Director at FDT Group

browser, so that any web browser can attach to it. We have enhanced the user interface that is aware of the dimensions of the screen, whether there is a physical keyboard or touchscreen. It has a responsive UI. "Secondly, a remote solution is great" a remote solution is great. But if you do not wrap that tightly with the secure remote solution, then it is not really a workable feature in a standard like ours. We have spent a great deal of time to look at the underlying architecture related to security, so that when people do work remotely with our new standard, whether that is because of reduced staff, whether it is because of some domain expertise, they can connect securely to that remote server. When you are doing online banking, we are all conditioned now to look at the URL bar and make sure that I am really talking to the server I think I am talking to, which is my bank, and it is not somebody fishing and trying to get me to give up my credentials on some other site. I think we are familiar with that. Certainly, the FDT standard has that capability built in. But there are also cases where the IT or OT department when these people work remotely, may not want to allow them to use just any device to access that remote server, but may require that it be an authorized device from the company, or one that has been secured by the company. Therefore, they can turn on an additional feature in the FDT server that will ensure that only authorized clients can even connect to the server. If you were under those circum-





stances, pick up your personal smartphone, even though you know the address of that server, when you try to connect it will simply refuse the connection. So, you would not even get to the point of being able to use your login credentials. It would be more like the server is not even there, is not going to talk with you at all, because you do not have an authorized client device. Thus, if we layer these kinds of features into the standard depending on the security profiles that the company wishes to maintain, they can turn on these enhanced features to ratchet up that security. Once you are in a confident, secure environment, you can log into that server. And you can do virtually anything you could do if you were standing physically in that same facility, so you can look at the health of your network, you can look at the health of your devices, you can get real time data from your devices, you can browse the manuals for the devices, you can set parameters on them.

In your opinion, what changes will bring 5G in industrial communication? What benefits will it bring to the factory? How can the FDT group can benefit from 5G?

5G, at its core, brings more of what the promise of IoT is, which is just smart devices connected

with physical networks wired up to some controller, but also devices that have no wire at all and are just sitting on a simple Wi Fi type network, for example, or Bluetooth network with its limited capabilities. You particularly can see these examples when you start thinking about AI applications, distributed DCs applications, or even in a classic industrial control environment where you wish to add additional sensing, additional monitoring capabilities to some process, instead of having to use hardware to do such. These devices can now have a 5G connection. And I think the real advantage here is simply the bandwidth and the additional security that 5G brings. The other advantage of 5G is that architecturally you can go up to the cloud with that device instead of necessarily having to go directly to a PLC or DCs.

From a FDT perspective, we immediately benefit from 5G because it is largely transparent to our standard. All the 5G capabilities can immediately be leveraged through the FDT standard. It does not matter what is the underlying protocol of that remote devices. Because we support all those protocols. Thus, it will be just a natural extension to the FDT standard.

Do you have anything more to say to our read-

ers?

The thing that we continue to see as one of the highest levels of interest, beyond just the mobility capabilities, is the whole built-in OPC UA capabilities. Since we already have direct lines of communications to all the devices, and we can see the health of all the underlying networks, it really is a powerful addition when you bring the FDT server into a control environment. Suddenly, all that working used to be done to get the information routed through the PLC up to the ERP or some other application now becomes almost a trivial exercise, because you can attach to the FDT server if you have the right credentials, and you can browse the data structure of the facility. You do not even have to necessarily know that particular device name. You can use the OPC UA capabilities, just browse, find the device, find what information is available to get that information integrated into your application. Yes, I think that this has driven a lot of conversations for end users about the capabilities of the new FDT standard. I think everybody is very comfortable with all the things we continue to do because of our legacy of configuration, diagnostics. The OPC UA capabilities are really an eye opener for people.

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PUSH-PULL CONNECTORS

New variant makes it easier to deploy M12 system



Through easy assembling process, the new Push-Pull variant from **TE Connectivity** makes it easier to deploy M12 system. the Push-Pull technology saves time during installation compared to

traditional M12 alternatives. When plugging in the connector, it will give haptic and acoustic feedback when it is correctly locked. This also allows the connector to be mated blindly. To be applicable in harsh environments, the connector will have an IP67 rating for resistance to intrusion of dust and water, ensuring efficient, high-quality and reliable connectivity with a high integrity signal transmission. Push-Pull technology allows the installer to lock the connector without the use of any tool. This makes it possible to have a higher density of PCB socket connectors compared to traditional M12 connectors. Locking the connector without a tool saves installing time in the field. This lowers the total applied cost. The new sockets of the push-pull portfolio will be compatible with traditional M12 screw type connectors. The push-pull interface with inner locking used in TE's M12 connectors complies with IEC 61076-2-012 specification for circular connectors with inner push-pull locking based on M12 connector interfaces according to IEC 61076-2-101, IEC 61076-2-109, IEC 61076-211 2-111 and IEC 61076-2-113.

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Maximizing 5G's Potential with Scalable, Intelligent, and Heterogeneous Computing

As 5G commercialization continues to take hold, anticipation is building for what 5G could mean for an increasingly connected world. Despite the transformative potential, performance, power, coverage and cost present roadblocks that could hinder deployment and application of the 5G network

Addressing the Challenges

When looking at performance, the sub 6GHz massive MIMO radio (32T32R and 64T64R) in the mid bands is the dominant form factor being deployed for the beam centric 5G NR across the globe. While field results have shown promising improvements, particularly for downlink throughput, performance has been below expectations. Additionally, power, coverage and cost are other issues that need to be resolved. Plus, uplink performance has been poor for UEs residing in the cell edge.

Operators and the system OEMs have learnt valuable lessons from the first wave of 5G NR deployments and are making several improvements in next generation 5G NR system design to overcome these issues. The cross-layer co-optimization between the scheduler

(MAC layer) and beamforming (Low PHY), improved functional partitioning for more optimal beamforming management and applications of machine learning (ML) algorithms are some of the leading areas of study and implementation. Adoption of more efficient GaN power amplifiers, improvements in the power amplifier linearization algorithms and integration of digital and ADC/DAC functions are the leading development vectors to reduce power and lower cost of the 5G NR massive MIMO antenna panels.

It is important to remember that we are still in the early phase of 5G NR commercial rollout. Enhanced mobile broadband is the leading use case to address the rapidly growing bandwidth demand in the mobile networks. The disruptive service based 5G core architecture is non-existent in the current de-

ployments. As 5G deployments move from non-Standalone mode (anchoring on LTE for control signaling) to Standalone mode, we will see the emergence of a service based 5G core network. The shift to a 5G core network would accelerate the emergence of new applications and use cases. This shift in turn would put further requirements on 5G NR base stations in terms of latency, throughput and reliability. The ability of the installed base of the 5G NR base stations to adapt to the emerging requirements over the next 3-5 years would be crucial to deploy new services.

Changing Needs of Operators

Certainly, next generation 5G equipment requirements have evolved with more operators planning deployments. The occupied bandwidth is doubling from a typical system bandwidth of 100MHz to 200MHz. The number of carriers and carrier combinations are also going up. And, digital front end is targeting much higher bandwidth for sub 6GHz radios.

Typical bandwidth requirements in the next generation 5G systems for mid bands or C band is 400MHz instantaneous bandwidth with occupied bandwidth of 200MHz. This is to enable multi operator equipment sharing as well as to reduce system SKUs to address customer requirements across different countries. New PA technologies are being considered for wide bandwidth radios, particularly GaN PAs to boost power efficiency by another 5-10%. Linearizing or digital pre-distortion of these systems is much more





Harpinder Matharu, Sr Director Technical Marketing, Wired and Wireless Group at Xilinx

complex and compute intensive. While all these changes are being implemented, it is mandatory to keep the power footprint same per MHz of the spectrum.

Maximizing 5G Network Potential

For operators who are building 5G networks, the sub 6GHz mid band beam centric 5G NR massive MIMO systems deliver much higher cell capacity along with the unique ability to direct capacity where it is needed. The macro radios in the low band have high coverage characteristics. Mobile network comprising of well-coordinated high capacity sub 6GHz massive MIMO systems and low band macro radios with large coverage area would be an ideal combination to offer scale, performance and cost-effective service rollout. To maximize network potential, 5G baseband systems need to be intelligent, with AI/ML algorithms, to make radios work in a well-coordinated way and to maximize performance per each radio node while efficiently load balancing traffic across these nodes. In addition, 5G mmWave radios could be deployed in addition to the sub 6GHz network at locations where high capacity is needed, and the radio environment is well suited for mmWave propagation. The 5G mmWave radios are in early trials and deployment in some parts of the world. This technology is expected to improve within the next few years to offer the

lowest cost of data capacity at several sites within mobile networks. Importantly, as the 5G core network is yet to be deployed, many new services and associated requirements will surface in coming years. It is crucial to have adaptable radios and baseband systems to accommodate these future requirements in the field to preserve and maximize returns on the CAPEX spent, while not missing on revenue streams on future 5G services.

Advancing Next Generation 5G Networks

As the industry sets its sights on the next-gen 5G networks, flexible, standards-based solution that combines software programmability, real-time processing, hardware optimization and any-to-any connectivity with the security and safety are needed. This will enable wireless system vendors to rapidly design, innovate and differentiate their solutions, with ease of field upgrades and significant TTM advantages.

Need for Adaptive Computing

With 5G infrastructure requirements and industry specifications still evolving, there is a strong need for the adaptive computing. The Xilinx 7nm Versal™ Adaptive Compute Acceleration Platform (ACAP), a new category of heterogeneous compute devices, is designed to address the requirements of next generation 5G equipment. The highly-inte-

grated, multicore, heterogeneous compute platform operates at the heart of 5G to perform the complex, real-time signal processing, including the sophisticated beamforming techniques used to increase network capacity.

5G requires beamforming and this entails significant compute density and advanced high-speed connectivity – on-chip and off-chip – to meet 5G's low-latency requirements. Adding to this, different system functional partition requirements and algorithm implementations lead to a wide range of processing performance and compute precision. It is extremely challenging for traditional FPGAs to optimally address this requirement while meeting thermal and system footprint constraints. Versal ACAPs offer exceptional compute density at low power consumption to perform the real-time, low-latency signal processing demanded by beamforming algorithms. The AI Engines, which are part of the Versal AI Core series, are ideal for implementing the required mathematical functions and offer high compute density, advanced connectivity, as well as the ability to be reprogrammed and reconfigured even after deployment.

Future 5G Networks

Looking forward, 5G networks need to be more scalable, intelligent, and heterogeneous. Technologies such as distributed small cells, massive-MIMO with hundreds of antennas, and centralized base-band processing via CloudRAN, will dramatically increase coverage and data throughput. Networks will need to connect securely through backhaul and optical fronthaul for processing. And, to ensure 5G can meet its true potential, operators and wireless infrastructure manufacturers need to leverage technology that can solve capacity, connectivity, and performance challenges, while also offering flexibility to support multiple standards, multiple bands and multiple sub-networks that enable diverse use cases and applications of 5G.

*Harpinder Matharu,
Sr Director Technical Marketing,
Wired and Wireless Group at Xilinx*

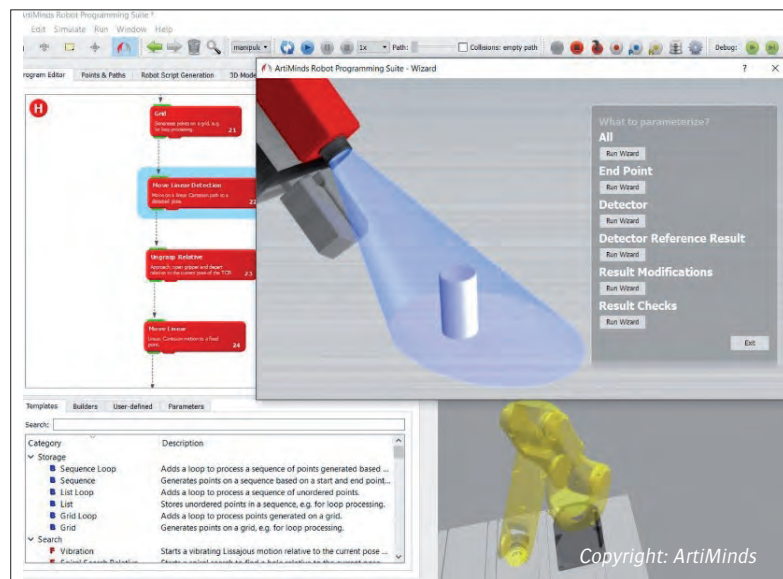
►► 60754 at www.ien.eu



Bin Picking Application: Robot Takes Over Machine Loading

looking for a solution to automate the loading of a screen-printing machine with air/oil separators, Mann+Hummel decided to use a cobot as well as ArtiMinds Robot Programming Suite (RPS) software for the entire programming of the cobot

Artiminds. The automotive supplier Mann+Hummel is the world market leader in filtration and employs 20,000 people at 80 locations worldwide. At its plant in Speyer, Germany, the company was looking for a solution to automate the loading of a screen-printing machine with air/oil separators. Previously a worker carried out this very monotonous and non-ergonomic task manually. Now, they decided to solve this task using a cobot from Universal Robots. The cobot should pick two air/oil separators from a grid box and place them on a timed conveyor belt, on which the filters are transported to the screen-printing machine for printing. Since the filters are provided partially sorted in several levels with intermediate storage, one challenge was the correct detection of the part position. Another requirement was that the detection jobs could easily be adapted to new variants of the filters.



The integration of hardware components such as a vision sensor is easily possible with ArtiMinds RPS



Taking out the filters of a grid box and placing them on a timed conveyor belt in the exact position: Mann+Hummel's new "employee" does not get tired and does not make mistakes

To keep the robot application flexible and to be able to switch back to manual loading if, for example, the robot has to be adapted to a new product, it was decided to use a cobot in combination with a light grid to ensure safety. A SensoPart vision sensor that is mounted above the feeding box and that is directly connected to the robot should handle the detection of the picking position.

To stay as flexible as possible and to simplify the deployment of the application, Mann+Hummel decided to use the software ArtiMinds Robot Programming Suite (RPS) for the entire programming of the cobot, including the integration of the vision sensor. Sascha Mummert, Technology and Process En-

gineer at Mann+Hummel explains: "Our goal was to proof the possibilities of current robotics technology and build up appropriate internal know-how."

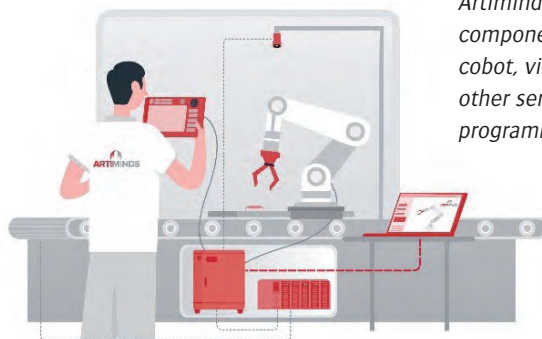
"With suitable components and the right software, even complex robotic applications can be flexibly implemented by our own employees."

ArtiMinds RPS makes it possible to generate robot programs intuitive and simple by drag and drop of predefined function templates. The desired task sequence can be put together in a modular way and the subsequent parameterization of the templates is done either offline in the CAD environment or online with



the real robot with an intuitive wizard system. This allows the user to focus completely on the actual process and its implementation, which offers much more flexibility, especially when doing first steps in the field of robotics and gaining initial experience.

By including the CAD model of the grid box in the 3D simulation environment, the cell layout could already be checked regarding collisions and reachability of the cobot during cell planning. With this setup, collisions can automatically be avoided during robot programming. ArtiMinds RPS' internal inter-face minimized the setup effort for the vision system and ensured a simple and standardized transfer of data to the robot. The result: A transparent robot program that is autonomously executed by the robot without having written a single line of robot code. The execution of the program was possible completely independent from the ArtiMinds software since native UR Script code was generated automatically by ArtiMinds RPS. Sascha Mummert summarizes: "The success-



Copyright: ArtiMinds

Artiminds RPS integrates all components of the robot system - cobot, vision sensor and possibly other sensors - in a standardized programming environment. The task sequence is simply compiled from predefined templates via drag and drop. The generated robot program runs directly on the robot manufacturer's standard controller

ful implementation of our pilot plant in Speyer has proven that with suitable components and the right software, even complex robotic applications can be flexibly implemented by our own employees."

Take aways of the Bin Picking application:

- ArtiMinds RPS simplifies the programming of sensor-based applications. In combination with sensor technology, even the program logic for cobot applications can quickly become very complex.

- The boxes are available in different variants. It was therefore important that the detection jobs could be easily adapted.
- External influences in production could not be completely ruled out, so robust detection had to be ensured.
- The installed application was to serve as a basis for further systems and the program created should therefore easily transferable to a new hardware setup.

►► 60749 at www.ien.eu



FANLESS AI BOX PC

Coming with NVIDIA® JetsonTegra TX2 Quad Core CPU



Distec is expanding its embedded portfolio with the industrial Embedded BoxPC EC-3200 from iBASE for applications with artificial intelligence (AI) with among the highest performance demands. The EC-3200 is based on the ultra-modern, energy-saving and powerful NVIDIA®

Jetson™ TX2. The processor combines exceptional speed and energy efficiency with a dual core Denver 2 and a quad core ARM® Cortex®-A57 processor. Compared to the Jetson™ TX1, the energy efficiency and performance has more than doubled. This is made possible by the ultra-modern NVIDIA Pascal architecture with 256 processing units and up to 1.33 TFLOPS. The EC-3200 thus offers real AI computing power for edge applications with 8 GB memory and 59.7 GB/s memory bandwidth. Due to its robust design, the EC-3200 is ideal for use in industrial robots, medical devices, and smart cities and for devices that support collaboration in companies. The EC-3200 is designed for an extended temperature range from -20° C to +60°C.

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►► 60271 at www.ien.eu

What is the key to mass production of traction motors for electric vehicles?

In electric mobility, integrating the right manufacturing technology is an important prerequisite for bringing these vehicles to market in the projected quantities. Hairpin welding is rapidly becoming a standard process in the production of electric motors

Scansonic. Electric mobility in the passenger car segment is gaining ground and virtually all major manufacturers are adding electric vehicles to their fleets or completely changing over their model line-up.

Car manufacturers are under pressure to master today's challenges in order to move forward with mass production of electric vehicles. Among other technological issues the automotive industry is placing high demands on electric motors. What they need is a maintenance-free unit that delivers high performance in the smallest possible installation space and can be cost-effectively produced in mass quantities.



As a material, copper places high demands on the control of the welding process – pore formation and spattering must be avoided by the optimized selection of parameters

Hairpins replace winding

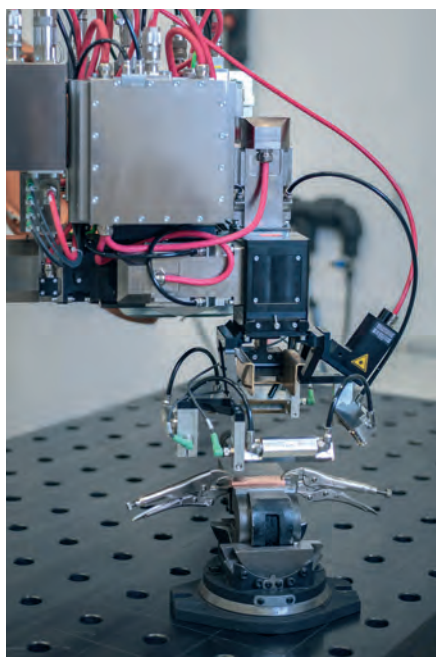
The stator is one of the most complex components of an electric motor and it accounts for the lion's share of production costs. As a result, hairpin technology is becoming more common in traction motors for electric vehicles. In place of winding, the coils consist of separate copper pins bent into the shape of a hairpin. Instead of mechanical crimping, the hairpin pairs are laser welded. This enables a more compact motor design.

Ensuring that the welding process is automated and extremely safe is of crucial importance. Depending on the electric motor design, 160 to 220 hairpin pairs must be welded for each stator. A single defective weld can render the entire component unusable. Laser welding is widely used in automotive production and offers numerous advantages. For instance, this process enables

an extremely precise and focused energy. This is important to ensure that the insulation layers of the hairpins are not damaged in the welding process. Laser welding is an easily automated, flexible process that enables shorter cycle times. But copper is a material that makes laser welding highly complex – and this calls for innovative solutions.

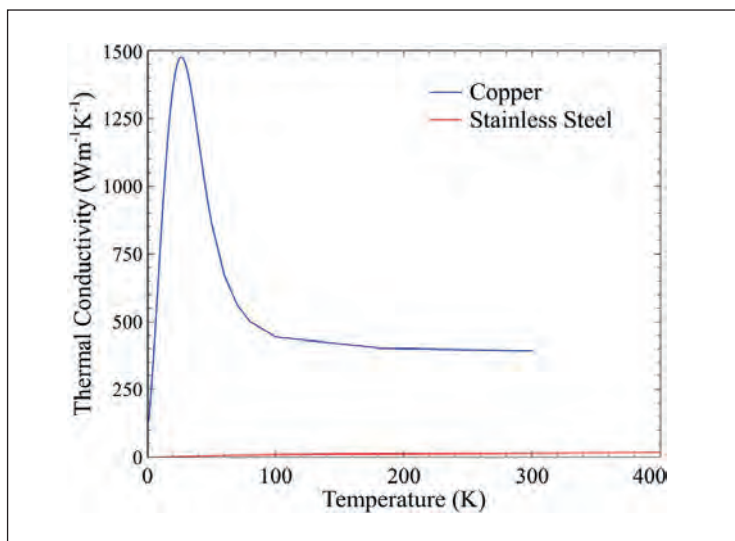
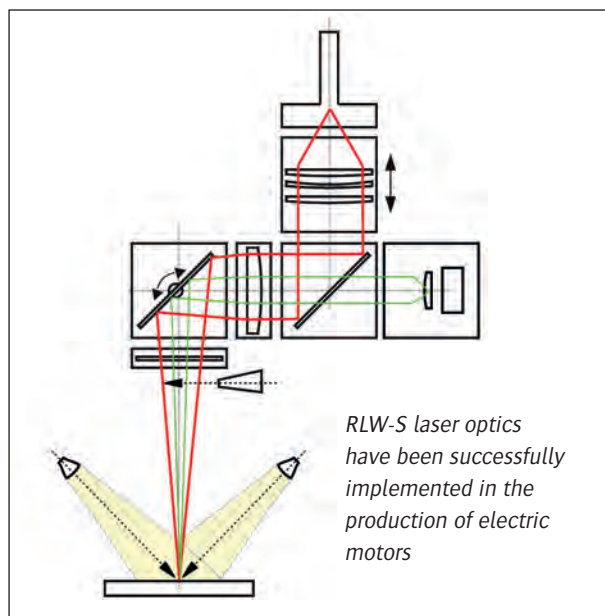
Copper is a challenge

The advantageous laser sources that are scalable in the power range are emitted in the infrared wavelength range at 1030 or 1070 nm. At these wavelengths, the absorption of laser light at room temperature is only around 5%. Shortly before the melting temperature is reached, the degree of absorption increases to around 15% and ultimately reaches nearly 100% when a vapor capillary, or keyhole, has formed.



The Scansonic RLW-S welding optics ensure high process reliability in welding copper hairpins for electric motors





Variation of thermal conductivities of copper and stainless steel with temperature

The viscous copper melt pool results in a distinct process dynamic that can easily cause spattering of the material when the keyhole briefly closes and the vapor pressure causes molten material to be ejected. Production, however, requires a process with as little spatter as possible to ensure no ejected material enters the stator because this could cause short circuits or other defects. However, no solution against spattering was available for the start of the process until now. It has been demonstrated that by specifically adjusting the relevant process parameters, such as laser power, speed and focus size, the keyhole can be stabilized in order to significantly reduce spattering.

Another challenge lies in the process steps required before the actual welding. The hairpins have a rectangular cross-section of only a few square millimeters. Before being inserted into the stator laminations, they are cut to length, bent, and the insulation is stripped from the ends. After insertion into the stator laminations the matching ends lie next to each other. All of these upstream production steps can influence the outcome of the welding process.

Advanced image processing

Any imprecisions in the positioning of the hairpins must be detected before the welding process begins. In laser welding, image processing is commonly used for this purpose. The Berlin-based Scansonic company is well known for its laser processing optics used in car body construction. Scansonic has adopted a unique approach to laser welding of copper hairpins with its line of RLW-S optics. High-performance scanner drives

are used to deflect the laser beam in order to maximize shape accuracy of the oscillation function, even at high frequencies. This guarantees a reproducible and highly reliable process.

Basically, two functional modules integrated into the optics work together to precisely determine the position of the hairpins.

The optics use conventional camera-based image processing. This is challenging because the surfaces of different hairpins reflect varying degrees of light. As a result, they appear in the grayscale image with widely varying levels of brightness and may not be reliably recognized. Scansonic engineers solved this problem by illuminating the surfaces from different angles to significantly improve recognition reliability.

Nevertheless, the camera system capabilities are limited because images of the hairpin pairs are only provided from the front side. Although the position and any possible gaps are recognized, the system does not detect a vertical offset between the two ends to be welded. This offset can be detected using laser line triangulation with a sensor that projects a straight laser line onto the surface of the two hairpins. The light is reflected and measured by the receiving element in the sensor. Using an angular offset between the projection unit and the receiving element, the sensor can measure the height profile of the object. The height offset is then precisely recognized and taken into account in the subsequent welding process.

Demand for short cycle times

Hairpins can be welded reliably in high quality using advanced laser optics with integrat-

ed image processing and the right controls for laser power and focusing. Assuming that a vehicle is produced with a cycle time of 60 seconds, one or more motors must be completed within the same timeframe.

To increase speed, it would be conceivable to use a large scanning field. This would allow all hairpin pairs to be welded without moving the stator. However, experience in the first production lines has shown that quality problems can be caused by the angular offset in the various positions of the stator. With this in mind, Scansonic focused on process quality and stability in the development of its RLW-S system. The company's engineers implemented a smaller scanning field made possible by post-objective scanning and an optimally adapted field of view of the camera. This ensures an optimal position of the laser beam processing point on the component and also applies to the position measurement of this point via the camera. In order to weld a complete stator, the unit must be rotated using a rotary axis. The desired cycle time is therefore a question of engineering and can be achieved with a powerful rotary axis. Standardized processing optics can thus take full advantage of their technological capabilities. Using this approach, Scansonic RLW-S laser processing optics have already demonstrated flawless operation on the production lines of a major car manufacturer.

Pravin Sievi responsible
for remote welding solutions -
Scansonic MI GmbH

►► 60781 at www.ien.eu



No Chance for Hackers: Secure Sensor Technology for Continental Hoses and Lines

: With the goal of more comprehensively equipping its rubber and elastomer solutions with sensor technology and intelligent systems, Continental has launched a collaboration – the sensIC project

At a glance:

- The sensIC project demonstrates integrated sensor technology based on printed electronics in hoses and lines for battery electric vehicles (BEV)
 - Continental expands its portfolio with hybrid electronics combining printed electronics and silicon chips
 - Project partnership with industrial firms and universities to run until spring 2024
 - Enhanced safety in vehicles and sensitive production facilities thanks to a sensor system involving a silicon chip for temperature measurement, a non-clonable safety feature, and external tamper protection by means of particle-based fluorescence detection
- For some time now, the technology company Continental has been equipping many of its rubber and plastic products with sensor technology, e.g. for condition monitoring, efficiency control and process regulation. Con-

tinental has launched a collaboration – the sensIC project – with partners from industry and R&D. As the collaborative coordinator, Continental is driving the project forward with its integrated sensor technology based on printed electronics for hoses and lines installed in electric vehicles.

Media-carrying lines for thermal management in electric vehicles

The project, which is being co-funded by the German Federal Ministry of Education and Research to the tune of 2.9 million euros, involves installing hoses for thermal management in electric vehicles with integrated temperature sensors. The electronics are designed so as to rule out manipulation during production, at subsequent stages of the supply chain or during actual use. Given the trend towards integrated electronics in



As project manager for functional printing processes, Dr. Tim Wolfer coordinates the entire research project



The project goal: a technology demonstrator with a trustworthy sensor system for the monitoring of temperatures in eVehicle hoses and lines

automobiles and systems, achieving a high degree of safety is becoming more and more critical. This trend is also paving the way for extended functionality and – to a greater extent than ever before – making it possible to offer services and digital business models spanning the entire service life of products, e.g. live information on system health, predictive maintenance services or post-delivery functional upgrades.

“The sensIC project exemplifies how integrated sensor technology based on printed electronics can be realized on an industrial scale. This represents a major contribution to the mobility revolution and enabling increasingly energy-efficient and sustainable solutions,” says Dr. Tim Wolfer who – in his





Continental has pooled its expertise in functional printing in a technology center with state-of-the-art machinery in Freiburg

role as project manager for functional printing processes – is overseeing the R&D initiative. Continental's declared goal for the project is to expand its product portfolio with safe electronics by integrating temperature sensor technology and communication modules into tubing systems. The resulting hybrid systems are based on a combination of printed electronics and specially manufactured silicon chips. The project is slated for completion in the spring of 2024.

Secure sensor technology guards against cyberattacks on vehicles and plants

Meanwhile, Continental is also equipping hoses in industrial facilities with sensors to monitor operating status and immediately detect any faulty or malicious manipulation of processes, for example in pharmaceutical or food processing plants. Another high-risk scenario being addressed: cyberattacks on vehicles, for sensors gauging and streaming such physical data as pressure or temperature are particularly vulnerable to hacking attempts. The security of sensors and sensor data is therefore of critical importance. "In order to meet precisely such requirements, it is important that we equip our products with a combination of mechanically flexible electrical circuitry and less flexible sensor chips so as to add value while increasing safety without added effort, and

with the lowest possible added cost," emphasizes Wolfer.

As an outcome of the sensIC project (whose acronym is made up of "sens" for sensor and "IC" for integrated circuit), hybrid integrated sensor circuits will be added to hoses and lines used in automotive and industrial applications for the monitoring of parameters such as battery temperature, or in drinking water systems and in the context of pharmaceuticals. This intelligent and safe sensor technology will be deployed in the form of a silicon chip for temperature measurement, a PUF (physical unclonable function) and external tamper protection by means of particle-based fluorescence detection.

More safety thanks to hybrid PUF circuitry

And this is how it works in detail: As an electronic, non-clonable identifier, a differential PUF circuit based on printed transistors and silicon-based read-in and read-out electronics is integrated with a sensor circuit. The sensor circuit contains a silicon IC that communicates with the hybrid PUF via a corresponding interface made possible by a specially engineered, packaging technology, thus forming a "secure" overall system. Integration is achieved by bonding the PUF to the silicon IC by additive processes, followed by encapsulation of the entire system. In addition to this, the security of the over-

all component will be enhanced by means of a tamper-proof, unambiguous recognition feature made possible by a random pattern of special inorganic fluorescent particles blended into suitable material components with a sealing effect.

In the final phase of the project, the integrated system will be subjected to the usual mechanical stress tests using a technology demonstrator, and then its electronic system will have to prove it can ward off various model-based simulations of cyberattacks.

A system suitable for many different applications

Besides its target use in the context of secure battery sensors, the resulting system can also be used in a wide variety of other applications. Among the possible uses to be explored by the project's partners is the



The German Federal Ministry of Education and Research is co-funding the project with a contribution of 2.9 million euros

monitoring of safety-critical hoses and lines for pharmaceuticals and raw materials, the goal being to ensure that they are completely tamper-proof, and that all components used can be tracked throughout their entire service lives.

Teaming up with Continental on this project are: Cyient GmbH, Polysecure GmbH, the Karlsruhe Institute of Technology (KIT), the Leibniz Institute for New Materials, Offenburg University of Applied Sciences and Elmos Semiconductor SE.

►► 60753 at www.iien.eu



How to Rightly Select Your Reactor

Elektra Elektronik points out the emergence of a new market as electric vehicle and charging systems have gained a momentum

Simpler network architectures/machine designs

As protecting condensers and filtering out harmonics in the energy quality area, reactors are used in many applications. They protect the motor drivers and motors in the industry. Besides, it is possible to enable protection against adverse effects of long transmission lines by using certain types of reactors. In regard with the selection of a reactor, thermal performance is of paramount importance and shall have the highest magnetic saturation points. **Elektra Elektronik** R&D Transformer Manager Ender Kasim explains that unless a suitable reactor is selected, there will be condenser and reactor incompatibility at the compensation panel. As a result, reactor power compensation cannot be done properly. From energy efficiency to the industry and production areas, reactors also protect sensitive devices against harmonics particularly in the areas exposed to high network pollution. Currently, reactors are observed to be a ris-

ing trend in the electric vehicles and charging systems has created a new market.

Eliminating issues originated by harmonics

The equipment used in the mining, metal, smelting furnaces and textile factories comprising high level of network pollution are prone to increase the harmonics which mean the electric pollution. Ender Kasim says: "In these industries, there are excessive loads which produce harmonics. If proper measurements are made and right reactors are used, harmonics will be reduced below the harmless levels as prescribed by international standards (IEEE-519). Thus, it becomes possible to eliminate the problems caused by harmonics. Our purpose is to achieve levels that meet and even surpass these standards in the facilities. When these standards are met or surpassed in the facilities, the likelihood of occurrence of untimely downtimes, increasing productivity, and improving the power quality and the voltage and current wave form. As a result, total power quality reaches up to optimum level".

Mind the thermal performance and magnetic saturation point

While selecting a reactor suiting to project and application area, thermal performance is crucial and magnetic saturation point must be as high as possible. Kasim adds: "Reactors used in the energy quality applications are the reactors that run continuously under full load. Thermal performance of these devices are of paramount importance. As they run continuously, selecting the lower levels of losses pays off itself in the long term. Furthermore, magnetic saturation points of reactors must be high as much as possible. Since loads and load characteristics vary from one facility to the other, the percent value of the harmonic changes too. These harmonics need to be measured and analyzed, according to which a reactor with suitable filtration rate must be selected. By this means, optimal solution is ensured thanks to the accurate filtration. Measuring THDV and THDI values of a facility and accordingly applying the reactor also play an important role. Otherwise, resulting incompatibility between condenser and reactor at the compensation panel will cause compensation panel to operate improperly. Therefore, reactive power compensation cannot be performed properly."

Reactors are used in the major projects

Elektra Elektronik produces harmonic filter, shunt, line and motor driver output reactors. Revealing that they will work on the medium voltage versions of these reactor types in 2021, Mr. Kasim concludes: "Thanks to our unrivalled design capability, and wide field experience, we are able to design the reactor that best suits to our customers, and also produce the reactor in the most optimal manner thanks to our production methods and precision measurement systems. Our harmonic filter reactors used in the compensation systems are our best-seller reactor type. As the technology advances, use of semi-conductors become widespread, which, in turn, increases the need for reactors which provide protection against side effects caused by them, and namely harmonics. Our reactors are used in the hospitals and major projects in Turkey such as Galataport. Harmonic filter reactors make up the highest share of our exports. We expect a sharp rise in driver input-output reactors due to the electric vehicle industry which gain momentum in the years to come."



Elektra Elektronik R&D Transformer Manager Ender Kasim

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HIGH-RESOLUTION CAMERAS

65 megapixel, global shutter and 10GigE



In the new hr65 CMOS camera, **SVS-Vistek** uses Gpixel's GMAX3265 sensor, combining the advantages of a global shutter with a very high resolution of 65 megapixels to suit demanding tasks in machine vision. The sophisticated temperature management of the camera ensures optimal cooling and thus excellent image quality of the 29.9 x 22.4 mm sensor. The hr65 combines all crucial features such as region-of-interest, lookup

tables, binning, image flip, sequencer and an integrated 4-channel strobe controller (all adjustable via GenICam or GenTL). All established machine vision software packages can integrate the camera via GenTL support and an SDK is also available.

►► 60746 at www.ien.eu

CONVEYOR SENSOR SYSTEM

Designed for reliable pallet detection



Leuze. Supplied as a pre-assembled unit, the sensor and holder can be pre-mounted on the conveyor directly at the factory thus protecting it from potential damage. The device includes an integrated sloping front screen of the bracket

deviating any dirt or debris that may fall onto it, resulting in less cleaning and maintenance than standard systems. Besides, the special ambient light configuration guarantee that they are insensitive to high-frequency LED illumination frequently used in production and logistics buildings, preventing unreliable operation of other types of diffuse sensors. The detection performance and exceptional function reserve of those new sensors enable a reliable detection of different pallet types.

►► 60709 at www.ien.eu

INTEGRATED ISOLATORS WITH MODULAR DESIGN

With high levels of pharmaceutical safety



OPTIMA. The new INTISO integrated isolator from Metall+Plastic provides complete isolator protection for filling and sealing processes with significant cost reduction. The new isolator design eliminates an HVAC unit and relocates

the cooling and ventilation units from the technical floor to the isolator plenum. This new modular design permits to reduce costs while ensuring a high level of pharmaceutical safety. A temperature adjustment of around $\pm 6^\circ\text{C}$ can be carried out with a cooling unit that is integrated into the isolator plenum. This allows to offset waste heat from fans or other isolator components by enabling constant temperature conditions to be generated regardless of batch sizes.

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SINGLE AND DUAL OUTPUTS POWER SUPPLIES

Higher accuracy and new features



Rohde & Schwarz new NGA100 series offers a choice of single and dual outputs up to 35 V/6 A per output, or 100 V/2 A per output. Single output models supply up to 40 W, dual output models up to 80 W power. The dual model outputs can be combined to provide up to 200 V or 12 A. The linear

design implemented in all output circuits significantly improves performance by making it no longer necessary to use any additional multimeter to set the correct power level. The R&S FlexPower technology enables maximum power to be achieved for a wide range of combinations, allowing a single instrument to support many different applications. Clear and intuitive, the interface displays instantaneous statistical functions for max and min power, voltage and current values directly on the screen.

►► 60701 at www.ien.eu

INNOVATIVE FLAT CABLE SYSTEM FOR CLEANROOMS

High levels of cleanliness with minimal abrasion



Tsubaki Kabelschlepp. The wear-resistant system with low vibrations enables to keep the quantity of airborne particles to a minimum. The use of materials with an extremely low

coefficient of friction ensures very low dust generation and a long service life of over 10 million cycles. Certified to ISO cleanroom class 1, the Cleanveyor is designed for maximum hygiene not only for production and testing facilities for semiconductors, LEDs and OLEDs but also for production systems in the medical and pharmaceutical industries. The wide temperature range of -10°C to $+80^\circ\text{C}$ further extends the field of application. This solution is gentle on the cables and minimizes noise generation thanks to a low variation process that guarantees a noise level below 38 dB(A).

►► 60710 at www.ien.eu

LOCAL ACTIVE HARMONIC FILTER

Eliminates the work and production losses



DynamiX from **Elektra Elektronik** represents a range of active harmonic filters. This series eliminates the energy quality issues originated from harmonics and high neutral grounding voltage (electrical pollution) in factories as

well as commercial facilities. DynamiX plays its role in terms of energy quality in the iron steel, maritime, health, textile, automatic and banking, industries for which safe and stable electricity system is of a crucial requirement. Moreover, it also mitigates wasted resources. Through extending the life cycle of the devices by enabling electronic devices of the factories accurately and fully performing, it helps avoid lost production due to the production line halt in the industry.

►► 60664 at www.ien.eu

RADIATION-HARD INSPECTION SYSTEMS

For HD nuclear inspection in hard-to-reach areas



Resolve Optics reports on its development of a radiation-resistant fixed focus lens for Ahlberg Cameras AB to enable high-definition Nuclear Inspection in hard-to-reach areas. As part of their development of a new radiation-hard inspection system - Ahlberg Cameras turned

to Resolve Optics to design and produce a robust, fixed focus non-browning zoom lens that could provide High Definition (HD) colour images and handle 50,000 Gy / 5,000,000 Rad total dose without degradation. The resultant Mini-Rad F30 HD camera series, incorporating the special fixed focus lens, is about 100 times more radiation tolerant than most currently available standard nuclear color HD cameras. These new radiation-hard inspection systems have been developed to replace old tube camera technology.

►► 60647 at www.ien.eu

SMART FIXED GAS DETECTORS

Operate in harsh industrial environments



Prosense manufactures the ATEX, IECEx, SIL2 approved PQD Series of fixed gas detectors. They are designed and developed to face the demanding conditions found in industrial plants, to carry out continuous measurement of combustible, toxic,

oxygen, and VOC gases. Highly robust, the PQD series delivers measurement stability, target gas measurement, and accuracy through its sensors. With a Pellistor, Infrared, Electrochemical, and PID sensor options, the fixed gas detector gives excellent results in LEL, ppm, and VOL ranges. The PQD's aluminium and SS316 stainless steel enclosure options provide great performance under harsh environmental conditions. 4-20mA and RS485 (Modbus RTU) outputs are simple to operate by connecting to Prosense gas detection panels or a suitable controller.

►► 60670 at www.ien.eu

HYBRID TERMINAL BLOCKS

Combine both screw and push-in connection



Onka aims at strengthening the coordination between assembler and final user with these hybrid terminal blocks. Hybrid terminal blocks avoid the question of "push in or screw connection?" in projects which speed and safety are prioritized by assembler

and operator. In addition, panels become more ergonomic and aesthetics with 90° connection possibilities for cables coming from different directions. Last, the product performs under all criteria of 60947-7-1 directives. The hybrid terminal block is available as of 2,5 and 6mm² sizes, with 10 colour options. The range goes from 0,34 to 6 mm² range, with/without insulated cord end terminal, single-core/multi-wire (flexible) connections.

►► 60663 at www.ien.eu

SIL 3 SINGLE-CHANNEL CURRENT DRIVERS

Designed for all types of signals



These SIL 3 isolated barriers from **Pepperl+Fuchs** are designed for all types of signals, both as modules for DIN rail mounting and as isolating components for termination boards. Positioners in a SIL 3 application can now be connected directly to the controller with a single interface module.

A SIL 3 application must no longer be realized via the elaborate path of redundant SIL 2 devices. In addition, isolated barriers with SIL 3 suitability can even be useful in SIL 2 applications, for instance, when the longest possible proof time is to be achieved. The new, single-channel current drivers have a width of 12.5 mm, line fault detection, and a separate fault output. This allows users to build SIL 3 applications from a single portfolio, whether with SIL 3 isolated barriers or with redundant, SC3-capable SIL 2 modules.

►► 60698 at www.ien.eu

SAAS PRODUCTS AVAILABLE ON PLATFORM

Shipped on the PTC Atlas Platform



PTC enlarges its portfolio of SaaS applications and production-ready solutions with the arrival of Vuforia Expert Capture™ and Creo Generative Design Extension

(GDX) joining the existing Onshape offering on the Atlas™ SaaS platform. These new applications will benefit directly from the operational and technical scalability of Atlas' modern multi-tenant architecture with a large set of capabilities such as version control, content management, and approval workflows. The advanced SaaS platform designed by the Onshape team has helped accelerate the development of Atlas and PTC's overall SaaS strategy. PTC continues to innovate in products and services by accelerating its time to market with more feature-rich products.

►► 60737 at www.ien.eu

MINI TURBINE FLOWMETERS

Upturn in demand for the 800-series flowmeters



Turbine flow meters offer the high level of repeatability and dependability required for accurate batch delivery systems. **Titan Enterprises** maintains certification under NSF169 for their 800 Series turbine

flowmeters and beverage dispensing flowmeters, as 'equipment for food and drinks products'. Based upon a unique Pelton wheel design and incorporating only non-metallic wetted components and delivering reliable, high performance over 6 flow ranges, from 0.05 to 15 L/min, these flowmeters are ideally suited for Brentingby Gin's application where both food hygiene and precision flow measurement are required. The bearings within the Titan mini turbine flow sensors are made of sapphire for long life and reliability. The body is moulded from inert PVDF to ensure there is no contamination to any liquid passing through it.

►► 60718 at www.ien.eu





Laser sensors for displacement, distance and position

Laser sensors from Micro-Epsilon offer high precision in continuous operation when measuring displacement, distance and thickness on numerous surfaces. Their web interface provides ease of use. Compact sensors from Micro-Epsilon are used in automation, production control and test bench. Please refer to the new Micro-Epsilon catalog for more information and application examples about the variety of models to overcome any challenge.

Micro-Epsilon Messtechnik GmbH & Co.KG
D - 94496 Ortenburg / Germany
 info@micro-epsilon.com • www.micro-epsilon.com

➔ 60141 at www.ien.eu



Wide variety of steel strip springs and applications

Ming Tai Industrial Co., manufactures steel strip springs, including constant force springs, constant torque springs, power springs and pre-stressed power springs. All steel strip springs can be used in wide variety of industrial product, which power human life beyond imagination. Steel strip springs can be designed for many different specific applications, welcome to consult with a Ming-Tai engineer early in the design phase to meet your need.

Link: <http://www.powerspring.com.tw/images/mingtai.pdf>

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