DATAWEEK
ELECTRONICS & COMMUNICATIONS TECHNOLOGY

21 March 2018

FEATURING: • Electronics Manufacturing Services & Equipment • Industrial/Automotive Electronics & Automation • Enclosures, Racks, Cabinets & Panel Products

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Bye, bye mister president, bye

Don McLean’s 1971 rock and roll classic, American Pie, is one of those rare works of art that manages to transcend the precepts of genre, place and even time. The opening refrain of its chorus – “Bye, bye Miss American Pie” – is instantly recognisable (at least to those of a certain age) and is still a staple of karaoke nights the world over, almost half a century later. Within its layers of meaning, the song didn’t merely reference musical events and personalities of the time, it served as a sort of cultural signpost, a way of proclaiming “We were here and these things mattered to us.”

In the era of mass media, there have probably been only a handful of events that have influenced our collective consciousness to such an extent that we will remember them for the rest of our lives, and even remember where we were when they happened. Think the tearing down of the Berlin Wall, Nelson Mandela’s release from prison, or the planes crashing into New York’s Twin Towers.

While not as earth-shaking as those events, the eventual resignation of Jacob Zuma on 14 February 2018 was a momentous occasion for South Africa, perhaps the biggest (and the greatest) news we’ve heard this century. As such, I remember clearly where I was when I heard: in an Uber, listening to the radio on the way to work the day after his announcement.

As I’m sure was the case for most of us, it was impossible to talk to anybody that day without the topic coming up, or without overhearing someone talking about it. The collective euphoria, the sense that maybe everything would end up being alright after all, has since given way to everyday reality, but the signs are positive that we could be at the start of an upward trajectory.

People used to joke that when Zuma opened his mouth, the Rand fell. Fittingly, after his last public announcement as head of state, it did the opposite – rallying to a 2% firmer trading level before settling at just below the R12 mark to the Dollar. It would be naive to think of Cyril Ramaphosa’s accession to the presidency as a panacea for all the country’s ills, but when it comes to global market, perception is often reality, and right now perceptions are good.

In the political game of musical chairs that is the ministerial cabinet, not all of Ramaphosa’s new cabinet appointments have been welcomed with open arms, but the general feeling is that they should be good for business. We tested this sentiment by interviewing three local electronics contract manu-
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**Overseas**

**Business**

- Net sales for the third quarter of Microchip Technology’s fiscal 2018 were $994,2 million, up 19,2% from the prior year’s third fiscal quarter. Net loss from continuing operations for the third quarter of fiscal 2018 was $251,1 million, or $1,07 per diluted share, down from a net income of $107,3 million, or 46 cents per diluted share, in the prior year’s third fiscal quarter: While 2017’s net income results were significantly adversely impacted by purchase accounting adjustments associated with its Atmel acquisition, Microchip’s 2018 third quarter was affected even worse by tax adjustments related to the USA’s Tax Cuts and Jobs Act of 2017.

- STMicroelectronics’ fourth quarter net revenues totalled $2,47 billion, a 32,6% year-over-year increase driven by double-digit growth across all product groups. For the full year 2017, net revenues increased by 19,7% to $8,35 billion and net income rose from $165 million ($0,19 per diluted share) in 2016 to $802 million ($0,89 per diluted share).

- ON Semiconductor announced that total revenues in the fourth quarter of 2017 were $1,38 billion, up approximately 9% compared to the same quarter the previous year but down roughly 1% as compared to revenue in the third quarter of 2017. Diluted earnings per share (EPS) were $1,22, based on net income of $529,9 million, compared with EPS of $0,26 and net income of $110,9 in the fourth quarter of 2016.

- Keysight Technologies reported financial results for the first fiscal quarter of 2018 ended 31 January. Its revenue grew 15% to reach $837 million, when compared with $726 million last year, and net income was $94 million, or $0,50 per share, compared with $109 million, or $0,63 per share, in the first quarter of 2017.

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**Companies**

- Qualcomm has raised its offer to buy NXP Semiconductors, a move which may consequently deter Broadcom from its persistent hostile takeover attempt of Qualcomm. The increased offer of $127,50 per share – substantially more than the $110 per share initially offered some 16 months prior – has been approved by Qualcomm’s and NXP’s boards of directors.

- Cree has acquired the assets of Infineon Technologies’ RF power business for approximately 345 million Euros. The transaction expands the Cree Wolfspeed business unit’s wireless market opportunity, and deepens the company’s penetration in growth areas such as electro-mobility, autonomous driving, renewables and technologies for a connected world.

- In a push to expand its solutions for the data centre, communications, defence and aerospace markets, Microchip Technology has signed a definitive agreement to acquire Microsemi for $68,78 per share in cash, amounting to a total equity value of about $8,35 billion. Microchip expects the transaction to be immediately accretive to its non-GAAP earnings per share, and anticipates achieving an estimated $300 million in synergies in the third year after closing the transaction.

- TDK has reached an agreement to acquire Chirp Microsystems for an undisclosed sum. Chirp is engaged in high-performance ultrasonic sensors featuring smaller sizes and lower power consumption compared with existing sensors. Its solutions are expected to find broader applications, such as augmented reality (AR) and virtual reality (VR), in addition to areas such as smartphones, automobiles, industrial machinery and other ICT applications.

**Industry**

- Worldwide sales of semiconductors reached $37,6 billion for the month of January 2018, an increase of 22,7% compared to the January 2017 total, according to the Semiconductor Industry Association (SIA). Global sales in January were 1,0% lower than the December 2017 total, reflecting normal seasonal market trends. Year-to-year sales increased substantially across all regions: the Americas (40,6%), Europe (19,9%), Asia Pacific/All Other (18,6%), China, (18,3%) and Japan (15,1%).

- Bloomberg reported that the Chinese government is planning to invest as much as 200 billion yuan ($31,5 billion) in its domestic semiconductor industry. This would accelerate the country’s plans to reduce its reliance on imported chips, and establish itself as a global leader in the industry – a possibility that the USA has publicly stated its concern over because of the potential to harm American business interests.

- The ten largest semiconductor R&D spenders increased their collective expenditures to $35,9 billion in 2017, an increase of 6% compared to 2016. Intel continued to far exceed all other semiconductor companies with R&D spending that reached $13,1 billion. In addition to representing 21,2% of its semiconductor sales last year, Intel’s R&D spending accounted for 36% of the top 10 R&D spending and about 22% of total worldwide semiconductor R&D expenditures of $58,9 billion in 2017, according to IC Insights.
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The future of Industry 4.0

The Industrial Internet of Things (IIoT) is a concept known by a number of different names – Industry 4.0, ‘factory of the future’, the fourth industrial revolution – but they all centre around the same principles: how businesses, and particularly manufacturers, use IoT technology to change or improve the way they operate.

“At its simplest level, it revolves around how machines interact with each other and how we know what’s going on within those machines through data,” says Alex von Schirmeister, chief innovation officer, RS Components. “This has been made possible partly through technological developments in communications, where we’ve seen low-power devices that can send data using very small amounts of energy.”

The term ‘Industrie 4.0’ originates from a German project on which the government and manufacturing industry worked together to develop and grow IIoT technology in the manufacturing environment. The result has seen some businesses, including engineering giant Siemens, lead the way in the use of IIoT in the manufacturing process.

Making the most of IIoT
According to Gartner, there were 6.4 billion things connected to the IoT in 2016, which was up 30% on 2015. But this is still the tip of the iceberg with that figure set to reach 20.8 billion by 2020 and with growth continuing onwards exponentially beyond that.

Yet despite these impressive figures there is further research that suggests many business leaders are cautious when it comes to committing to IIoT technology. A survey by Accenture showed that although 84% of C-suite executives saw the opportunity for their organisations to create new income streams from IoT technology, 73% of companies have not made any concrete investment in it.

“On a macro level, the big data that IIoT creates, when analysed, can point businesses towards bigger strategic moves,” says Von Schirmeister. “This could include reorganising production across the board or changing working patterns, which will create further efficiencies on a much grander scale.”

The future of IIoT
There are numerous predictions about how IoT will impact manufacturing around the world and how it may change the nature of the industry. What most experts are sure of is that companies that adopt IIoT will see financial rewards for their investment.

How this investment and value are spread among manufacturers will not be equal, however, with the pace of IoT adoption varying greatly between businesses. Organisations will need to develop different business models where assets create recurring benefit for customers with ongoing value for the business. Some of these models include compliance monitoring, preventative maintenance, remote diagnostics and asset tracking.

While experts can debate the potential of this sort of model, it is impossible at this stage to predict the exact outcome of IIoT and its influence on the manufacturing sector. Just as taxi companies and short-term holiday accommodation have been disrupted by Uber and Airbnb, the manufacturing sector must wait to see what sort of disruption will be caused by digital connectivity.

“At RS we are supporting customers with IIoT in two ways – first by providing the latest technology to connect devices, and second by providing a platform, in the shape of Design Spark, for engineers and other experts to share knowledge and innovate. I see the future of IIoT and IoT in general as an inevitable growth point where the technology becomes ubiquitous – similar to mobile phones, wireless Internet and other technology that we take for granted. The idea of virtually any product or device talking to other products or devices will simply become the norm,” von Schirmeister concludes.

For more information contact RS Components, +27 (0)11 691 9300, sales.za@rs-components.com.
R&D tax incentive applications streamlined

The South African government has reduced the red tape required for companies to apply for a research and development (R&D) incentive, by reducing the turnaround time to 90 days.

This follows the establishment of a task team by the minister of science and technology in 2015 to address bottlenecks experienced by businesses accessing the incentive, and includes measures such as simplifying documentation and application processes and improving guidance provided to firms on how the incentive works.

The programme, which was established in 2006 as an instrument to stimulate private sector investment in R&D and innovation, has been beset with several challenges including administrative delays, complex information and limited access for small and medium enterprises and startups, hindering the private sector’s response to the programme that offers tax breaks through the South African Revenue Services (SARS) to companies investing in R&D.

In a breakfast seminar held with the private sector in Pretoria on the 2nd of March, the department of science and technology’s (DST) chief director for science and technology investment, Godfrey Mashamba, announced that government has implemented the recommendations made by the task team. The task team findings and recommendations covered a range of issues dealing with both the measures to simplify administrative processes and the policy-related matters.

“An online system of submitting applications was implemented. Besides eliminating the paper-based forms, this system should improve information management and decision turnaround times,” said Mashamba. Through this online system, applicants can now register, complete an application, and immediately receive acknowledgement. They can also track progress towards a decision, and in the future will be able to submit progress reports on approved R&D.

The DST says much progress has already been made in processing applications, citing that between October 2012 and the end of February 2018, 1212 (95%) of the valid applications received were adjudicated and 1054 (82.5%) received decisions on their applications. In addition, the number of small businesses applying to the programme increased to almost 480 this past financial year, compared to only 331 in 2014/15.

On the downside, Ms Hayley Reynolds from the national treasury indicated that it was not feasible to increase the tax deduction rate to 150% and to introduce a refundable tax credit to support SMEs, which she said would increase cost to the fiscus.

Speaking for the first time as minister of science and technology, Mmamoloko Kubayi-Ngubane said companies of any size, in any industry, could qualify for the tax incentive. “At a corporate tax rate of 28%, the incentive benefit translates into a benefit of 14 cents per Rand spent on R&D, thus reducing the marginal cost of R&D. That gesture is a reflection of the extent to which government is committed to promoting a conducive environment for business to operate,” she said.

The minister urged the business sector to take advantage of the incentive and invest more in R&D, and said one major challenge was that gross expenditure on R&D (GERD) as a percentage of the GDP remained below 1%.”That reflects an underperformance relative to our own policy targets and some comparable economies, which have gross expenditure on research and development to GDP ratio (GERD)/GDP of around 2%,” she said.

For more information visit www.dst.gov.za
NEWS

New appointments at Otto Wireless Solutions

As Otto Wireless Solutions continues to grow, the company has welcomed three new employees to its team.

Siphiwe Mashinini became a permanent employee in December as the newest addition to the technical support team; Daphnie Raseota recently joined the customer service department on 1 February; and lastly, Refiloe Mathiane, as the new face of the company, also joined on 1 February as the company’s receptionist.

For more information contact Otto Wireless Solutions, +27 (0)11 791 1033, wireless@otto.co.za.

Quectel earns automotive certification

Quectel Wireless Solutions has earned IATF 16949:2016 certification, a stringent quality management system standard for the automotive sector.

The IATF 16949 standard was developed by the International Automotive Task Force (IATF) and the ISO technical committee. It defines the requirements of a quality management system for organisations in the automotive industry, and is widely recognised by leading automotive manufacturers and OEMs.

“Quectel has been serving a lot of Tier 1 customers and major car OEMs in China, and is in a good position to serve some global car OEMs,” commented Min Wang, Quectel’s automotive product director. “Gaining the IATF certification will bolster their confidence in Quectel and enable our automotive-grade AG35 module to further penetrate the auto segment.”

The AG35 mentioned is an LTE category 4 module designed and manufactured in accordance with IATF 16949:2016 standards. It is targeted at IoV (Internet of Vehicles) applications such as fleet management, vehicle tracking, in-vehicle navigation systems, vehicle remote monitoring, vehicle remote control, security monitoring and alarming, remote vehicle diagnostics and in-car entertainment.

“Attaining IATF 16949 certification marks a major milestone for Quectel, which means that we have a complete quality assurance system throughout the whole procedure of wireless module design and manufacturing,” said Fred Fu, Quectel’s quality department manager. “Our non-automotive customers will also benefit from this certification which guarantees that we will take an uncompromising stance on product quality and safety.”

For more information contact ICORP Technologies, +27 (0)11 781 2029, enquiries@icorptechnologies.co.za.
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- **Secure Communications** – Authenticated device pairing and IoT cloud communications
- **Secure Firmware Update** – Securely upgrade firmware remotely

Download the IoT Security Suite Evaluation Kit (free) to get started.
Adding flexibility to USB

Brigham Steele, principal validation engineer from Microchip Technology, explains how FlexConnect technology brings flexibility to USB's otherwise rigid host and device roles.

Rigid system roles are used in the USB protocol to maintain order. One processor acts as the host and this issues commands to the device, which responds to the host's commands. This works well where there is one central processor controlling many support devices. However, these days microprocessors are embedded in a variety of devices, including tablets, laptops, ultra-books and smartphones, and thus the host may not be the same device in every application.

To get round this problem, Microchip came up with the idea of FlexConnect, a feature unique to the company's USB hubs and available on the USB253x, USB3613, USB3813 and USB46x4 devices. Using FlexConnect lets the hub dynamically change the physical ports that act as upstream and downstream ports so a designer can develop a product that acts as a USB host and device without having two dedicated connectors. A system with this capability on one port can expand the devices connected to that port through the hub.

Applications

Portable applications include smartphones and tablets, devices that can act as a device or a host. Accessories to these devices can also be used with FlexConnect to expand the capabilities of the dock or device. For example, the downstream port of a dock can use FlexConnect to support a dual-role compatible tablet or smartphone, letting it receive a change and act as a host.

Many also use these portable devices in their cars. An automotive entertainment system that includes FlexConnect can act as a host when connecting devices such as a thumb drive or card reader or as a device when connecting to a smartphone or tablet.

Automated test stations can also take advantage of this technology to connect to existing ports on the final product. This lets the test systems download new firmware to the SoC, communicate with all devices in the system and execute automated routines to lower the overall cost, as shown in Figure 1.

The software on the microcontroller may not be able to fully test all the connected devices and an automated test system could significantly reduce costs. It may thus be necessary to add internal test fixtures that would require the hub to change directions. FlexConnect lets the tester control the USB hub without any hardware changes to the USB system.

Requirements

There are various ways a USB host can transfer ownership of the bus to the device. When a hub is added, even more factors need to be considered to make sure all devices know what role they are meant to play.

The low-level signals involved are: Vbus, generally 5 V and supplied by the host; DP, where the host has 15 kΩ pull-down and the device 15 kΩ pull-up to 3.3 V; DM, where the host has 15 kΩ pull-down; ID, which is an option used in OTG (on the go) applications and is pulled up by the OTG enabled device; and the GND common reference.

There are two ways a port can change from a host to a device. First, the processor can dynamically change whether an exposed port acts as a host or a device through low-level software commands. If the host sends a special command to the device to change directions, the software will also execute the low-level direction change. In the OTG specification, this is known as the host navigation protocol (HNP). With this internal method, the host maintains the Vbus voltage supply after it has switched roles to act as a device.

Secondly, the ID pin can be used to signal the USB port on whether it should act as a host or device. The device enables a weak pull-up resistor on the ID pin and then monitors the state of the pin. If the ID pin is high, the device checks for the presence of a host by monitoring Vbus and, if found, acts as a device. If the ID pin is low, the device drives 5 V on Vbus and acts as a host.

This used to be done through the wiring of the USB cables. A Micro-A connector would short ID to GND and have a standard B plug at the other
end of the cable. A Micro-B connector would float ID and have a standard A plug on the other end. An intelligent USB system could change the state of the ID pin, thus changing the host and device roles of the OTG ports.

If the internal role reversal command is used to change directions, the control of the USB bus passes to the new host. This means the original system is at the mercy of the software of the new host. The original system can, however, take back control by removing Vbus. If the new host suspends the original system, it will stop sending start-of-frame packets (SoFs) and the system should enter a low-power state. However, the SoFs will also cease if the new host is disconnected entirely.

If the external role reversal procedure is used, the Vbus and ID states should be monitored. To determine if the new host was disconnected, Vbus would be removed. If the new host wants to pass control back to the original system, the ID pin would be connected to ground.

Enabling FlexConnect

There are three ways to enable FlexConnect – through the SMBus, by driving a digital pin high, or through a custom setup packet to the hub controller. There are also various high-level ways of using the technology, such as with OTG.

Although the USB hub is not fully compliant with OTG, a system can take advantage of some of the OTG features to implement a dynamic change in direction. Many processors have OTG-capable USB ports but only one USB device is supported per port and a hub is needed to expand the number of devices. The ID pin is used to determine the direction. The OTG connections are shown in Figure 2.

When a Micro-B connector is inserted into the socket, the ID pin is left floating and is sampled high by the microcontroller, which communicates to the hub through SMBus to determine the state of the Vbus DET pin. When ID and Vbus DET are both high, a USB host has been detected on the exposed connector and the OTG port of the microcontroller must be configured as a device.

When a Micro-A connector is inserted into the socket, the ID pin is shorted to GND and is sampled low by the microcontroller. A USB device detected on the exposed connector and the OTG port of the microcontroller must be configured as a host. Figure 3 shows the data flow when connected to a USB device.

FlexConnect can also be implemented with portable devices that receive their power from an accessory that they will later allow the device to control. For example, a smartphone can be plugged into an automotive console to charge the battery but later the user may want to use the smartphone interface to play music. In this case, the infotainment unit must send a USB command to the hub and the smartphone to initiate the change in control.

Figure 4. Reverse direction control data flow.

The USB system is configured and can function independently. The downstream port of the hub has battery charging enabled and will enumerate the other downstream ports. When the smartphone is connected, it detects the Vbus voltage and battery charging handshake and starts charging. The infotainment unit enumerates and controls the device. It can then pass control of the hub to the smartphone if the user wants to use its interface. The data flow is shown in Figure 4.

Conclusion

Modern electronics systems require more of the USB than ever before. With the FlexConnect feature, designers can develop more advanced systems because it allows the hub to change the direction of the data flow.

For more information contact Tempe Technologies, +27 (0)11 455 5587, willem.hijbeek@tempetech.co.za.
REGULAR

REGULAR SYSTEMS, COMPONENTS, DESIGN

From now on, LEDs, varistors and PFC coils can also be selected in a practice-oriented way on the basis of the measurement data stored in the system. The tool’s redesigned user interface allows developers to select electronic components quickly and precisely based on numerous parameters and filter options.

REDEXPERT was launched by Würth Elektronik eiSos in 2015 as a tool with the world’s most precise AC loss calculation for power chokes, and has been continuously expanded ever since. The same also applies for the LED, varistor and PFC coil product groups. The tool’s basis is formed by real measurement data which the manufacturer of electronic and electromechanical components determined in real circuits.

In the latest version of the online platform, navigation is more convenient and a wide range of application models is available in the application area for improved component selection. This means that parametric filters can be applied directly in the graph of the components.

Based on several charts, such as voltage against current or service life curves, users can select their varistors in a practically oriented way with the help of measurement-based data. For LEDs – UV, IR, visible and white – the luminous flux can be determined precisely in the chart and the product table for any forward current based on measurement data. For PCB ferrites, the impedance curves can be displayed for different DC currents and the anticipated attenuation in the circuit, taking into consideration the input and output impedance of the system. A model based on real measurement data is included for calculating AC loss of power chokes, with which AC and DC losses can be determined precisely for almost any topology.

The most important functions and operating concepts are explained in video tutorials. REDEXPERT is freely available to users at www.we-online.com/redexpert.

For more information contact Jason Page, Würth Elektronik eiSos, +27 (0)71 259 9381, jason.page@we-online.com.

REGULAR SYSTEMS, COMPONENTS, DESIGN

XMC module for defence and radar systems

Pentek introduced the newest member of the Jade family of high-performance data converter XMC modules based on the Xilinx Kintex Ultrascale FPGA.

The Model 71132 is an XMC module featuring eight 250 MHz, 16-bit analog-to-digital converters (ADC) with eight wideband digital down converters (DDCs) and 64 multiband DDCs, all fully programmable. The board doubles the number of ADC channels and DDCs over previous models, giving this the best price per channel ratio in the product family. Applications monitoring a broad spectrum with a need to quickly analyse specific portions of the identified spectrum can benefit from the capabilities of the 71132. Such applications include defence and radar phased-array systems.

Factory-installed functions include eight ADC acquisition IP modules, each containing nine DDCs. In each module, the wideband DDC supports decimations from 2 to 32 for capturing signal bandwidths up to 100 MHz. The eight narrowband DDCs allow decimations up to 1024 for signal bandwidths down to 200 kHz. These two types of DDCs operating in parallel are ideal for applications that need to monitor a wide spectrum, but quickly tune to identified frequency bands of interest for further analysis.

The Navigator FPGA Design Kit (FDK) includes a wealth of Pentek IP library modules so customers can easily add custom IP to support specific needs.

For more information contact Rugged Interconnect Technologies, +27 (0)21 975 8894, sales@ri-tech.co.za
Rugged box PC for mobile applications

MEN’s latest box PC, the BL51E, is equipped by default with an Intel Atom E3950 processor running at 1.6 GHz, and offers performance scalability through a variety of other dual-/quad-core processors from the Intel Atom E3900 series. With 8 GB of DDR3 SDRAM memory, a backward-accessible SD card and a SATA HDD/SSD shuttle, as well as integrated eMMC memory, the computer has the necessary storage capacity for applications such as entertainment servers or video surveillance systems.

The BL51E is typically used in the transportation sector, such as on trains, buses or commercial vehicles, and can be used to provide wireless on-board functions like an Internet connection for passengers, or to localise the vehicle’s position. A variety of I/O functions and options smoothly connect the machine to the Internet of Things, with four PCI Express minicard slots, two micro SIM slots and dual SIM support provided. This provides maximum flexibility for implementing mobile service standards with up to 4G LTE or WLAN. There is also a GNSS interface for GPS or GLONASS.

Two Display Port interfaces with a maximum resolution of 4K, four Gigabit Ethernet ports (two of them with Power over Ethernet support), two USB 2.0 ports, a serial I/O port and a CAN bus interface complete the I/O functions. The complete system is designed for fanless operation in a temperature range of -40°C to +85°C. Thanks to the integrated 30 W/24 V d.c. wide-range power supply unit, the box PC complies with railway standard EN 50155 and with ISO 7637-2.

For more information contact Rugged Interconnect Technologies, +27 (0)21 975 8894, sales@ri-tech.co.za.

Cloud connected last-mile test solution

Viavi Solutions has introduced the Mobile Tech application to further enhance the connectivity of its OneExpert family of instruments. Leveraging the always-on connectivity of Android/iOS mobile devices carried by most technicians, Mobile Tech allows syncing anywhere at any time, including in the truck between jobs.

Test results can be geotagged and augmented with pictures or video files by leveraging the GPS and multimedia capabilities of the mobile devices. OneExpert meters can be synced anywhere and anytime the user’s mobile device has Internet connectivity. Always-on capability means that managers get faster access to test data, and technicians have the latest work orders assigned to them.

Test results can be geotagged to pinpoint service locations and prevent spoofing of test results, and records of completed tests can be enhanced with pictures or videos of what was found and fixed.

For more information contact Tshiamo Mogakwe, Concilium Technologies, +27 (0)12 678 9200, info@concilium.co.za.

Fibre-optic connector inspector with Wi-Fi

The FOCIS WiFi2 is AFL’s new fibre-optic connector inspection system that uses an Android or iOS wireless connection for live image video streaming, auto-focus and more. The probe is ergonomic and lightweight, fitting comfortably and balancing naturally in the hand.

The probe hardware has a single multipurpose button, a single multi-colour functional status LED, and a battery charging port for all-day mobility. The status LED enhances workflow productivity by allowing rapid operator assessment of the cleanliness of the fibre endface – either passing or failing standard rules – as well as a ‘fibre not found’ error notification.

The FOCIS WiFi2 uses AFL’s large portfolio of inspection adaptor tips for both connectors and bulkhead sleeves, including all 2,5 mm (SC, FC, ST) and 1,25 mm (LC) ferrules, as well as multi-fibre connectors and bulkhead sleeves (MPO/MTP/MPO16). AFL offers an adaptor tip for high-density LC PC/UPC optical distribution frames as well.

A free app for Android and iOS supports live image video streaming, auto-focus, IEC / IPC standard and user-customised pass/fail auto-analysis, pinch-to-zoom on endface images, report generation, multi-language GUI support and day/time stamped job saving.

For more information contact Comtest, +27 (0)10 595 1821, sales@comtest.co.za.
Local manufacturers look forward to a brighter future

By Brett van den Bosch.

The handing over of the reins of the South African presidency, from Jacob Zuma to Cyril Ramaphosa, has come at a pivotal time for the country’s engineering, mining and other related industries. While Ramaphosa’s reshuffle of the cabinet received mixed reviews, a positive uptick in business sentiment is reflecting a general sense of renewed hope.

*Dataweek* interviewed three South African electronics contract manufacturers to find out what they’ve been up to lately, and what their outlook is. The respondents were Jannie van Toorn, financial manager at Leratadima Tellumat Manufacturing; Pieter de Nysschen, general manager: partner and business development at Omnigo; and James Loggie, general manager at Specialised Manufacturing Technologies (SM Tech).

What are some of the latest developments at your company?

**Jannie van Toorn:** We have expanded our workforce over the last six months. While there has been no major spend on equipment in the last year, we did purchase new equipment in the prior 12-month period. We are currently reviewing the need to improve our surface mount technology (SMT) capacity as well as increasing production automation and ancillary processes. This is considered necessary to (a) increase throughput, (b) meet increasing quality and reliability needs, (c) satisfy a mix of low- to high-volume production needs, and (d) satisfy delivery expectations.

**Pieter de Nysschen:** 2015 marked an exciting period of time for Omnigo, with numerous exciting developments in the company. We were acquired by Reutech, which is a part of the Reunert group, towards the end of 2015. We are proud to be associated with this prestigious and venerable group that has contributed to the South African Economy in many ways since 1888.

We made significant investments in capital expenditure to upgrade our plant and machinery. This has increased our capacity by upwards of 30% and has contributed to us retaining our reputation for delivering superior quality manufacturing services.

**James Loggie:** Having moved to new premises at the end of 2015, we embarked on an upgrade of our equipment mix, culminating in the installation of a new Yamaha Y5 line during the course of 2017. This line consists of a YS24/YS88 combination linked to a GKG printer and Heller oven. This upgrade has significantly increased our production capacity, moving us from a strictly small capacity prototype/small-run facility to a medium-run operation which still has a significant focus on prototyping.

Do you feel the local electronics manufacturing industry is thriving, struggling or stagnant?

**Jannie van Toorn:** We feel the industry is currently stagnant, but that the future environment is looking positive with good growth prospects, largely dependent on local content imperatives imposed on government procurement. Having stated this and noting that South Africa has a small electronics contract manufacturing (ECM) sector, any ECM will soon become extinct if it cannot deliver on its promise and the customer expectations created by this promise, i.e., it must be able to attract business based on performance.

**Pieter de Nysschen:** The electronics manufacturing industry is, in my view, still a growing and fairly young industry. I am always amazed when I discover some new small business that has developed a new product and approached us to manufacture for them. This happens quite frequently, and we are only one of several contract manufacturers in South Africa.

South Africans have a lot of ingenuity and this directly impacts the electronics manufacturing industry. Omnigo’s performance has exceeded our highest expectations these past three years, so certainly for us the industry is alive and well and thriving. There has been significant investment in electronics contract manufacturers by various entities – this would not be the case if this was a struggling or stagnant industry.

**James Loggie:** I think we are slightly more buoyant as an industry than we were last year, with current indications pointing towards a positive future. We’re all watching president Cyril Ramaphosa, public enterprises minister Pravin Gordhan and finance minister Nhlanhla Nene very carefully.
Are you optimistic that the improvement in business sentiment will be good for the industry, and for your business in particular?
Jannie van Toorn: Yes, we are very optimistic. However, this now depends on how the new leadership approaches the need to support and develop the local manufacturing sector. This focus, mentioned by president Ramaphosa in his state of the nation (SONA) address is encouraging, but only government action will determine to what extent the current optimism will be realised. Support for South African innovation is vital to maintain local ECM viability.

Pieter de Nysschen: The improvement in investor confidence will definitely help local industries. Some of the initial decisions have been very positive, for example the re-appointment of Nhlanhla Nene as finance minister. For a net exporter like ourselves this does have some impact in terms of the rate of exchange in the short term. However, we remain cautiously optimistic that South Africa, the local electronics industry, as well as Omnigo, will benefit with South Africa under new management.

James Loggie: We are a lot more positive, and the general mood amongst customers is positive and projections about the future are good. But let us not get ahead of ourselves. Cyril Ramaphosa has taken some very promising steps with the reappointment of Pravin Gordhan and Nhlanhla Nene. Markets are showing signs of confidence but it’s what happens in the long term that will really affect our future. We need sustainable long-term growth in the economy.

Does the improved value of the Rand in relation to the Dollar help or hurt your business?
Jannie van Toorn: For us as a contract manufacturer, it’s neutral as any changes in input costs, positive and negative, are passed on to our customers. The ECM customer who sells locally will benefit from a stronger Rand-Dollar exchange rate.

Pieter de Nysschen: In the short term there will be some pain for exporters, however the long-term benefits should outweigh short-term setbacks due to the strengthening Rand. Hopefully in the eyes of the rest of the world, South Africa will have gained some credibility again. Domestically improving economic conditions should have longer-term positive results, provided the momentum can be maintained, and this should stimulate growth in this industry as well as in others.

The Rand is still considerably weaker than the Dollar which should ultimately weigh in our favour for exports. If the domestic interest rate can stay fairly constant – which it has over the past 10 years – South Africa should still be an attractive investment destination for foreign investors.

The fact that the Rand has gained traction signifies greater demand for the Rand internationally. A weak Rand pushes down inflation which negates any benefit an investor can derive from the weaker exchange rate. On the other hand a strong Rand coupled with a consistent domestic interest rate and a stable political situation will stimulate international investment. Hopefully South Africa now has good balance of all these elements with a more business orientated government.

James Loggie: For us I think it balances out. In the volumes of the market segment we represent (small to medium runs), SA-based manufacturing is still very competitive and ‘comfortable’ for our customers. We are aware that very often we are competing against quotes from Japan but are also aware that it is not always an easy decision for customers to make. We have both lost and gained customers back in this scenario. The value that relationships bring to the party still counts as an important decision-making factor for many of our customers.

Are there any new trends in terms of what customers are expecting from an ECM?
Jannie van Toorn: Yes, a small percentage of customers’ designs (those who export their products) are using the latest-technology components, causing electronics contract manufacturing to invest in new equipment to handle that technology. As such, we are having to adapt to a changing landscape.

Customers expect, as a basic part of the service, a product of high quality and reliability, which is delivered on time. The challenge has always been the on-time delivery of material, specifically electronic components, for manufacturing products – this has the highest impact on delivery and cost. The nature of electronics contract manufacturing is to be flexible and continuously adapt to meet differing customer needs and, as a minimum, to remain abreast of technological progress. Not doing so will drive an electronics contract manufacturer out of business.

Pieter de Nysschen: There are a number of new trends which are going to impact electronics contract manufacturers in the foreseeable future.

Smart electronic devices will have a tremendous impact, especially on the consumer electronics industry. The newer generation of users will more and more desire or even demand smart technology interfaces for consumer electronics.

This trend is already making an impact on the industrial market where manufacturing, mining and industrial machine manufacturers move toward smart user interfaces to remain competitive and efficient. We have seen the effect of this on our clients who have to stay innovative to compete, especially in the global market. As technology advances, smart electronic capabilities will become the norm rather than the exception.

The demand for environmentally ‘green’ technology also has an impact, although not as rapidly for the industries we mainly serve. This, however, still remains a considerable factor that has to be catered for and addressed, especially for certain niche markets.

For Omnigo’s customers, as in most industries, the factor of costs versus lead-time is one of the major challenges we face. Our customers are experiencing pressure on pricing, and subsequently this is passed down to us. On the other hand, demand for electronic components in the European and Asian markets has created a significant supply backlog where we are seeing lead-times of 25 weeks plus. The demand for automation to contain and reduce costs and lead-times, although always a factor, is currently a major factor to consider and mitigate in any ECM operation.

James Loggie: Quality remains key. Our philosophy is to keep the customer happy and, through the strength of that relationship, anticipate what they may need in the future. Placement of 0201-sized components and flexible printed circuit board placement enquiries are on the up.

We are very fortunate to have a strong relationship with Microtronix. This results in us being able to assist customers with time sensitive prototype/small runs, whilst Microtronix is able to assist with high-volume runs. It also means that we are able to tap into a wealth of industry expertise.

For more information contact Jannie van Toorn, Leratadima Tellumat Manufacturing, +27 (0)21 710 2400; Pieter de Nysschen, Omnigo, +27 (0)12 803 8218, pieterd@omnigo.co.za; James Loggie, SM Tech, +27 (0)12 653 2330, james@smtech.co.za.
The day began not unlike others. Leave home, get a bagel and a large cup of caffeine, and drive to the office. I am the president and CTO of an equipment manufacturing company located in Southern California. Most days begin with a walk through the factory floor, and a short conversation with my management team. This day, however, began with an unusual phone call. The man on the other end of the phone call stated, ‘I am a lawyer and I need your help.’ This was to be an interesting day.

There are several unique words and phrases associated with my business, words not commonly used at cocktail parties or chance encounters with strangers. During my phone call with the lawyer, words and phrases such as dendritic growth, CAF and ECM were thrown about. While these words and phrases would certainly be the most uninteresting cocktail party conversation starters, they were music to my ears. You see, my company manufactures equipment that removes process residues from circuit assemblies, as well as machines that test assemblies to quantify the level of cleanliness. Dendritic growth, CAF and ECM are all reasons we are in business.

Here’s the scoop: there were two companies engaged in a lawsuit. The plaintiff was a startup company fuelled by venture capitalist money. They had a product idea associated with transportation technology. This is the point in my story where I should inform the reader that my descriptions of the primary players shall remain intentionally vague as I am bound by a non-disclosure agreement.

The plaintiff created a new technology that consisted of a sensor and a receiver. The sensor would be installed in the ground and send signals to a receiver mounted on a nearby pole above ground. Because the ground-based sensor would not be installed in the ground and send signals to a receiver mounted on a nearby pole above ground. The plaintiff had the skillset required to design a functioning circuit and related product, they lacked the ability to produce it. Enter the contract manufacturer (CM), soon to be the defendant.

This part of the story is most likely typical. The intellectual property (IP) owner provided a Statement of Work (SOW) to the CM. The SOW provided the minimum amount of technical detail. The IP owner cited a couple of IPC standards, specified a bill-of-materials including a bare board material described as ‘down and dirty cheap FR4’ (a description that would not serve them well during litigation).

The CM ordered bare boards from a Chinese board supplier. Components were ordered and the CM began to produce product for their customer. The SOW required the following procedures in the production of the assemblies:

- The product required a multi-layer board with the selection ‘standard FR4’ (no slash sheets).
- The assembly would be reflowed using an organic acid (ORH1) lead-free solder paste.
- The assembly would be cleaned using a water-only inline cleaning system.
- Successfully tested assemblies would be encapsulated into a hockey-puck sized plastic container using a silicone material.
- Function tested at a specified temperature for a specified amount of time. All products were subjected to testing.
- Post cleaning, a high-mass electrical component would be manually soldered to the assembly using a lead-free solder and no-clean flux. Due to the component’s mass, flux was added to the component via a squeeze-bottle. No further cleaning would be performed.
- Once the assembly was fully assembled (reflowed and hand soldered), a battery would be installed and the assembly would be subjected to thermal testing. Assemblies were loaded into ovens and function tested at a specified temperature for a specified amount of time. All products were subjected to testing.
- After cleaning, a high-mass electrical component would be manually soldered to the assembly using a lead-free solder and no-clean flux. Due to the component’s mass, flux was added to the component via a squeeze-bottle. No further cleaning would be performed.

Lessons learned from an ECM and the customer that sued them

By Michael Konrad, president, Aqueous Technologies.
were cleaned using just water, a physically large component was hand-soldered to the assembly using no-clean (REM1) flux. Even though extra flux was added via a squeeze bottle to the assembly, no additional cleaning was provided. There were two issues with the installation of this large component.

First, because of the component’s mass, extra flux was required for proper wetting. So much flux was applied that excess flux travelled to parts of the component and assembly that were not exposed to the heat of the soldering iron. This allowed for the flux’s activators to remain intact rather than being burned off during the soldering process. Because the IP owner (author of the SOW) believed all residues from no-clean flux were inert and harmless, the excess flux residues (and the activators contained therein) were allowed to remain.

Another omission in the process standard was any form of bake-out. While subjecting boards or assemblies to a bake-out is frequently not required, in this case there were multiple reasons to conduct a bake-out. First, circuit boards used in the project featured a multi-layer design. Multi-layer boards can pick up moisture from various steps along the way, including fabrication, transportation, storage and wash processes. In this case, the boards were fabricated in China and sent by ocean freight to the United States. Once the boards were received by the contract manufacturer, no special (dry box) storage was provided. There was also no evidence of a first-in-first-out (FIFO) inventory strategy.

Additionally, the assemblies were subjected to a water-based cleaning process utilising an inline cleaning system equipped with a common airlife drying system. Airlife drying systems are effective at removing most of the surface moisture added to the assembly during a wash process. They are not normally effective at removing entrapped moisture or moisture within the board layers.

The absence of a baking process was justified by the IP owner because the assembly would eventually be encapsulated in silicone, allegedly protecting it from environmental moisture in the field. While this belief is partially true, the application of this logic sealed the fate of the assembly by likewise sealing in all the sins of the assembly process. More on that later...

After the assembly was complete and subjected to a thermo-cycling quality control procedure, it was sent to a contract conformal coating company. Citing best practices, the contract conformal coating company recommended to the IP owner that the assemblies be cleaned and baked prior to coating. This suggestion was refused by the IP owner. At one point, the thermo-cycling equipment failed and was unable to properly perform the required quality tests. The IP owner waived the test requirements and rejected the pre-encapsulation cleaning and baking suggestions in the interest of maintaining production quotas, in part because their investors were pressing them to ship product. The repercussions of these decisions, in totality, were about to become evident.

Several design and production decisions contributed to a disastrous outcome. Just months after the product was shipped to customers and installed several inches below city streets, the batteries began to fail. The same batteries that were expected to last ten years were rapidly draining, and were dead within a few months. By the time everyone agreed there was a problem, sixty thousand units needed to be recalled. The IP owner believed the contract manufacturer was at fault and initiated a lawsuit against the IP owner. This led to the hiring of various experts to determine the cause of the product failures.

Here were our findings:

Issue #1: CAF

The multi-layer circuit boards contained micro-cracks beneath the surface of the board, emanating from the drilled through-holes and vias. Plating solution used to copper-plate the through-holes and was entered the micro-cracks. This is not an unusual phenomenon. It can be caused by dry-weave, drilling of through-holes, and multiple thermo-excursions.

Electrical current, conductive solution (plating fluids) and moisture combined to exploit the micro-cracks and form conductive anodic filaments (CAF). CAF is a form of electro-chemical migration (ECM) that occurs beneath the board’s surface. The formation of CAF allowed unwanted current flow between anodes and cathodes, reducing the dielectric properties of the board, resulting in premature battery drain and, in some cases, direct shorts.

Remedies

There were several missed opportunities to eliminate the possibility of CAF failures. First, because these assemblies were to be installed in harsh environments, and because they would not be easily accessed once installed, and because the product was exclusively powered by a battery, more caution should have been exercised in the selection of board materials. There are CAF-resistant laminates available which would have reduced the likelihood of CAF.

Second, the absence of a bake-out process contributed to CAF. As previously stated, CAF requires four elements: electrical current, a pathway (micro-cracks), conductive materials (plating solutions) and moisture. Proper baking would have removed the moisture and eliminated the possibility for CAF to form.

Next, circuit design can either increase or decrease the propensity for CAF. Voltage, component density, via locations and other factors all influence CAF. IPC TM650 26.25 outlines CAF testing, and failure analysis laboratories offer specialised CAF prediction testing. Depositions of the design engineers confirmed that there was no knowledge of CAF, nor any design or process considerations regarding CAF.

Issue #2: dendritic growth

The presence of dendritic growth was evidenced in many of the failed assemblies. Dendritic growth is another form of ECM. Unlike CAF, dendrites grow on the board’s surface, between cathodes and anodes. Dendritic growth requires three elements: electrical current, conductive materials and moisture. The conductive materials required for dendritic growth include flux residues as well as residues from board fabrication, component fabrication and the assembly.

Remedies

The removal of residues from the assembly would have eliminated the possibility of dendritic growth or other surface related ECM issues. The contract manufacturer, at the direction of the IP owner, cleaned the assemblies after reflow using a water-only cleaning process. This allowed all non-polar residues to remain on the assembly. The implementation of a cleaning process with a chemical additive would have allowed all residue species, polar and non-polar, to be removed.

Additionally, the installation of an additional component after cleaning allowed flux residue to remain on the assembly. The application of excess volumes of flux allowed much of the flux’s activators to remain on the assembly. In this case, there are two remedies. The residues could have been subjected to a manual cleaning process (the component was not compatible with water). Alternatively, the assembler could have minimised the volume of flux added to the assembly, ensuring all of the no-clean flux that was added was adequately heat activated, burning off harmful flux activators.

Issue #3: no bake-out

The IP owner believed because the assembly would be encapsulated in silicone, it would be protected from moisture and other harsh substances. Unfortunately, encapsulation had the opposite effect. Encapsulation actually sealed in moisture. Because the board was never subjected to a formal bake-out procedure prior to encapsulation, moisture was sealed in. There was enough moisture to exploit the board’s micro-cracks, plating solution and electrical current to result in CAF failures. There was also enough moisture to combine with electrical current and flux and other process residues to allow surface-level dendritic growth to occur.

Remedies

In this case, even with excessive residues allowed to remain on the assembly, and even with the board’s micro-cracks, an effective bake-out procedure just prior to encapsulation would have decreased and possibly even eliminated all ECM related failure possibilities.

The bottom line

I am sure we have all been in a situation where we were asked to provide a service or a product in a manner that was not correct. We may be asked to take shortcuts or produce a product or service in a manner that represents less than best practices. While few of us would knowingly agree to build products we know will fail, it is easier to, over time, agree to small changes. Perhaps we are requested to shorten testing time or skip a bake-out process or purchase cheaper materials, little by little jeopardising the product’s long term reliability.

It is amazing how these two companies didn’t have the time to do it right, but had the time to do it over. Sometimes the most profitable word in business is “no”.

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Manufacturing islands employed in Siemens IPC production

Siemens industrial PCs (IPC) have been leading trends for over 30 years. As early as 1983, Siemens started combining standard PC technology with characteristics that fulfilled demanding industrial requirements, and with its Simatic IPCs it has since continued to set new milestones.

With 4500 employees, the company’s site in Karlsruhe is the fifth largest location of Siemens AG in Germany. It includes the Process Industries and Drives division, with process industry and process automation being the focus of the site.

Innovation strength, quality based on fully optimised production steps, and real flexibility for the customer are the pillars of success for Siemens Manufacturing Karlsruhe (MF-K). Siemens manufactures about 24 000 different products at this site, including flat components for other sites. In addition to products for industrial communication, such as network and identification components, the Karlsruhe plant focuses on developing and manufacturing the trendsetting systems in the Simatic product range.

"Meet the Future in Karlsruhe” are the words that welcome visitors at the entrance area of the manufacturing complex, and visitors will indeed see state-of-the-art manufacturing which focuses on maximum flexibility and short production times. “We manufacture on a build-to-order basis,” explains Josef Kühn, a planner and designer in the technology department who looks after selective soldering processes. He has been with Siemens since 1981, and thanks to his work at various sites he can rely on a wealth of experience.

“A configurator supports the customer in selecting a processor, memory size or extension cards, and lets the customer order IPC products in any quantity – as low as one piece,” says Kühn. “Our standard delivery time of just 15 days means that our manufacturing process must be absolutely flexible and able to absorb daily fluctuations.”

Flexible production concept for fast implementation

The production concept behind the fulfilment of individual customer requirements is based on modern manufacturing islands. In addition to the ability to cost-effectively produce small lot sizes, the standalone ‘island’ production approach largely eliminates process-related waiting times and supports the manufacture of the highest-quality products – to name but a few of the advantages.

The basic prerequisite for flexible manufacturing islands is of course the flexibility of the individual production plants within an island. “We ensure this flexibility by using selective soldering units from Seho,” adds Kühn. “A number of the manufacturing islands employ multiple GoSelective, PowerSelective and SelectLine systems from Seho. We produce 232 different types of flat components for IPCs, 136 of which with Seho soldering systems.”

The most recently installed manufacturing island for IPCs combines a SelectLine with a PowerSelective system, plus assembly workstations and automatic handling systems from the Seho Streamline range. This arrangement allowed the system to be optimised for Siemens’ requirements. A total of four assembly workstations include manual component assembly. The intelligent design starts with component storage. “While the assembly takes place at the workstation, the rear of the unit allows us to prepare for the next product version,” explains Kühn. “We then simply turn the component storage around and get started on the next job. This saves a lot of time.”

The finished components are then moved on to soldering in a SelectLine system which is also designed to be highly flexible. The system is equipped with two electromagnetic solder units with
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different soldering nozzle sizes to accommodate a wide range of
different soldering geometries without re-tooling.

PCBs which are soldered exclusively on SelectLine systems are
passed through a separating station and are automatically returned
to the assembly workstations. All the other PCBs are automatically
passed to a PowerSelective system for further processing.

PowerSelective systems are also equipped with a mini-wave
soldering unit and they have a conventional soldering wave as a
special feature. “This enables us to cover a highly varied product
range with just one soldering system. The flexibly programmable
gripper system, which can be freely rotated and tilted, gives us an
excellent solder outline and high-quality soldering results,” says
Kühn. “Any production system is only as good as the components
that have been installed in it,” he adds with a smile.

Indeed, the exact type of IPC that is produced using this manu-
factoring island is the one that ensures process reliability for the
PowerSelective system. Kühn explains: “Process safety is obviously
our top priority. The Simatic IPCs are designed to provide maxi-
mum performance and durability. This would hardly be possible
without a reproducible manufacturing process.” To support this
need, the selective soldering systems from Seho all offer 100%
automated process control.

Maximum nozzle service life for maximum
process safety

Especially in selective soldering processes, where the smallest
structures need to be processed with high accuracy, residues in
the soldering nozzle can have a major impact on the reproducibility
and the quality of the results. “Depending on the type of solder
alloy and the number of soldering cycles, the soldering nozzle may
show signs of flux deposits and oxide residue which would nega-
tively affect the soldering result,” explains Alexander Blum, product
manager with Seho Systems GmbH.

A sound process depends on a robust solder wave height
and wetting surface. An evenly wetted and oxide-free soldering
nozzle is of utmost importance. Soldering nozzles must therefore
be cleaned and rewetted regularly. This is a process that typically
requires system downtime and the use of aggressive chemicals.

The IPC manufacturing island at Siemens in Karlsruhe is used in
a 2/3 shift operation scenario; production stoppage to allow the
nozzles to be cleaned manually was not an option. Instead, the
SelectLine was fitted with patented Seho ultrasonic cleaning tech-
nology. In freely programmable cleaning cycles the liquid solder
is oscillated, which gently cleans the nozzle surfaces and re-wets
them under exclusion of atmospheric oxygen. “Our experience has
shown that cyclical ultrasonic cleaning significantly improves the
service life. With SelectLine nozzles, we have an average service life
of approximately 2 months – typically we would get just a few days
with other comparable systems,” says Kühn. “The extended service
life obviously has a positive impact on process reliability, and the
automated nature of the ultrasonic cleaning process reduces the
workload for the system operator.”

Another benefit, in addition to higher availability and lower
material wear, is the system’s low environmental impact, as no
chemicals are used during the cleaning process. “This, in combina-
tion with other automated control mechanisms that are integrated
in the system, ensures a fully monitored process,” says Blum.

Successful together

‘Made by Siemens’ is a globally recognised trademark that stands
for quality, performance and efficiency. “The same stringent
requirements that our IPCs satisfy, we also place on our production
processes. And in Seho we have a partner on our side who takes
the same approach,” explains Kühn.

The electronics industry is one of the most dynamic sectors
worldwide and constantly presents new challenges to manufac-
turers. This is especially true for trendsetting companies such as
Siemens. “At times, our attempts to optimise production processes
may seem unorthodox,” Kühn sums up. “But with Seho as our
supplier we always have a competent partner with whom we can
cuss new tasks.”

A collaborative partnership can ensure that new ideas turn into
innovative technical solutions which go into series operation after
a joint optimisation phase.

For more information contact Quamba Technologies,
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Panasonic placement machine wins global award

The machine is the latest stage in the evolution of the NPM series and is geared for manufacturers who value setup and changeover time over speed.

“The NPM-W2S was designed to solve manufacturer’s need to tighten control of their work in process, minimise changeover, and expand feeder capacity while accommodating smaller lot sizes in a cost-effective manner,” said Shawn Robinson, senior product marketing manager, Panasonic Factory Solutions Company of America. “The solution addresses these challenges as well as expanding standard component range from 03015 mm microchips to massive 100 x 90 mm components and connectors nearly 150 mm long and up to 30 mm tall.”

The machine delivers 100 N insertion force for greater odd-form capability and increases pin-through-hole device imaging capability via optional pin-in-paste illumination. Equipped with a multi-recognition camera, it enables component alignment, defect inspection, chip thickness and 3D co-planarity inspection in a single pass to promote high productivity and quality. Optical character recognition (OCR) and pre-pickup inspection features allow unique recognition of tray-fed parts from barcodes, lines and polarity marks to determine proper pickup angles, even if parts are fed incorrectly.

Single- and dual-lane mode functionality promotes the capability to process extremely long LED panels nearly 1200 mm in length. It can automatically convert modes to dual-lane ‘shared’ or ultra-productive ‘hybrid’ mode. The NPM-W2S offers features to enhance efficiency such as automated board support pin placement, self-aligning feeder cart changeover, intelligent feeder anywhere, and 2D-coded nozzle anywhere. It further enhances production quality with thermal expansion compensation, board warp mapping, a 20- or 40-position direct pick tray tower, and closed-loop component monitoring with material verification, control and trace.

Manufacturers can scale production lines from low- to high-volume depending on production needs, while conserving investments until production or technology requirements mandate. OEMs and EMS providers can reconfigure the machine heads in minutes. The NPM-W2S also incorporates existing CM series Panasonic feeders and nozzles to minimise capital investment and reduce inventory expense.

For more information contact Techmet, +27 (0)11 824 1427, info@techmet.co.za
Taking us forward, EDA Technologies is delighted to again bring world-leading electronics technologies to the southernmost tip of the African continent. This time though, I must admit it made me eat my words. Some years ago, I confidently said: “You cannot just press a button and expect a PCB to come out.” Well, in what is a major disruption to the electronics industry, 3D PCB printing is now a sure reality, thanks to Nano Dimension’s innovative Dragonfly Pro 2020 additive printer.

CNET described the Dragonfly printer as ‘The Holy Grail of 3D printers.’ EDA Technologies is proud to be associated with Nano Dimension as the local value-added reseller of their majorly disruptive Dragonfly 3D printer. I had the pleasure of meeting Simon Fried in California in February this year, Simon is the co-founder of Nano Dimension and leads its activities overseeing business development. A smirking Simon referred to my statement above and apologised for making me eat my words. I gracefully accepted his apology.

Nano Dimension is disrupting, reshaping and defining the future of how electronics products are made. Imagine being able to 3D-print fully-functional devices such as PCBs, sensors, antennas, moulded interconnect devices (MIDs), conductive geometries and more – in just a few hours. The rapid prototyping capabilities of the DragonFly 2020 Pro 3D printer completely transform the way product development teams work – no more waiting weeks for a custom prototype that must be made offsite. Being able to rapidly produce and test new circuitry is an invaluable capability in our fast-paced competitive world.

In a survey conducted by the Aberdeen Group, improved time-to-market was identified as a primary business objective, ahead of the need to reduce product cost and improve product quality. What I found more fascinating from the Aberdeen report is that 88% of best-in-class companies launch their products on time. The survey shows that electronics companies need product development cycles that are shorter, more agile and efficient. In today’s fast-paced world, that means everything.

Until now, standard lead times for complex multilayer prototypes could stretch to several weeks, often accompanied with fervent hopes for the first version to work without the need for another costly and deadline-threatening PCB revision. Traditional PCB subtractive manufacture is bound by a number of fixed processes, which in effect haven’t changed that drastically in many decades.

3D printing has revolutionised product design and manufacturing by using additive manufacturing methods to produce prototypes and custom parts in a fraction of the time required by traditional subtractive manufacturing. Product development teams no longer have to wait days or weeks for a custom PCB prototype because the DragonFly 2020 3D printer offers the capability to 3D print an entire multilayer board, part of it, or just a test fixture at any given time. In addition, the full range of PCBs can be printed, including interconnections, through-holes and complex geometries – without etching, drilling,
ELECTRONICS MANUFACTURING SERVICES & EQUIPMENT

FEATURE

plating or waste. The application possibilities are endless, including flexible, rigid PCBs and embedded components.

Nano Dimension’s extremely precise inkjet deposition system allows for simultaneous 3D printing of conductive silver nanoparticle ink (metal) and insulating ink (dielectric polymer). This sets new standards for accuracy, complexity and speed in the fields of both 3D printed electronics and professional electronics development. Upon completion of a 3D print job, there is no need for post-processing. Multi-material 3D printing is game-changing, allowing designers and engineers to print polymers and metals together to create a functional part. This is a revolutionary approach to making electronics with the potential to be more compact, denser and ultimately non-planar.

Futurists list a number of new technologies as the highest growth markets for the immediate future, and these include: drones, the Internet of Things (IoT), artificial intelligence (AI), robotics, autonomous transport and wearable electronics. Since printed electronics are at the heart of most of these associated devices, these sectors can all benefit greatly from a more agile approach to developing products. For sure, South African companies should embrace advancements that can enable them to be more agile, and more importantly, get winning products to the local and global market before anyone else.

The DragonFly Pro 2020 3D printer empowers progress, encourages innovation, lessens development risks and probably most importantly, enables faster time-to-profits. That should mean good news in any language.

EDA Technologies will have a DragonFly 2020 Pro 3D printer in a few months’ time, the first for the southern hemisphere. Here's to another chapter of electronics development agility.

For more information contact EDA Technologies, +27 (0)12 665 0375, sales@edatech.co.za

Panasonic’s modular NPM-D3 component mounter is equipped with all the cutting edge technology demanded of modern electronics manufacturing equipment. The system’s lightweight, 16-nozzle head combines with a highly rigid frame and multi recognition camera to ensure precision placement of small components. It can handle 03015 sized chips and boasts placement precision down to 0.25 μm.

Dual conveyors on the NPM-D3 can either run independently of one another to produce different boards, or productivity of one board can be boosted by running it on both conveyors simultaneously. Intuitive software allows even operators with relatively little skill to perform feeder setup quickly.

An advanced camera performs measurements in 2D and 3D while maintaining high production. High quality is achieved by upright suction, thickness detection, front and back inversion, lifted leads detection and missing solder ball detection.

For more information contact Techmet, +27 (0)11 824 1427, info@techmet.co.za

Modular component mounter

In applications that demand extreme channel density, the 5 Series MSO Low Profile sets a new standard for performance. This mixed signal oscilloscope offers 8 input channels (plus AUX Trig) and 12-bit analog-to-digital converters in a compact package, only 3.5 inches high (2U).

With 1 GHz analog bandwidth, 6.25 GS/s sample rate on all channels, and 125 M record length, the 5 Series MSO Low Profile has the performance you need to capture accurate waveform data with the best possible signal integrity. 12-bit analog-to-digital converters provide 16 times the vertical resolution of traditional 8-bit ADCs. Measure small signal details, even if they are riding on large signals.
Solve Direct invests in cutting-edge rework machine

Electronics manufacturer and training provider Solve Direct Electronics (SDE) has boosted its technological capacity by investing in the Seamark ZM-R62000 BGA rework and re-balling machine.

The system will enable the company to help its customers and trainees comply with the stringent ball grid array (BGA) placement requirements in South Africa, where the company believes there is a severe shortage of professionals offering high-quality, reliable BGA placement and re-balling of lead-free and tin-lead BGAs.

"In order to replace defective components, reprogram firmware or install a daughter board on complex or high-reel printed circuit board (PCB) assemblies, we wanted a rework system that combines ease-of-use with reliability and precision," says Neil Johnson, director and founder at Solve Direct Electronics. "These high-precision rework systems feature advanced optical alignment, automated component removal and replacement, and both top and bottom hot air for de-soldering and soldering.

"They are ideal not only for delicate, heat-sensitive and expensive surface mount devices (SMDs), such as BGAs, chip-scale packages (CSPs) and ultra-fine pitch quad flip packages (QFPs), the stations can also be used for rework and repair of light emitting diode (LED) strips and boards."

The Seamark system will be used in SDE’s training, manufacturing and maintenance operations, allowing much greater precision in the positioning, heating and soldering of BGA components. The machine’s key functions include:

- A linear slide function that establishes a X-, Y- and Z-axis that can micro-adjust with rapid positioning and precision.
- A touch-screen controlled heating system with optical alignment for user-friendly operation that ensures positioning precision.
- Connection to a computer for additional control and convenience.
- Time and temperature control systems that are industry-designed from various types of lead and lead-free profiles to ensure that soldering is reliable and effective.
- Three independent heating areas from top to bottom with infrared pre-heating.
- A powerful cross-flow fan to rapidly cool down the PCB, preventing deformation and ensuring natural solidification of solder connections.

"The cutting-edge technology ensures that we provide a one-stop service to our clients rather than sub-contracting these processes," says Johnson. "As an emerging and evolving company we realised that we were at a disadvantage by not investing in this capability earlier. The risk was lower production yield, lower product quality and higher costs directly related to the reliable placement of these sensitive and complex BGA components," he adds.

For more information contact Fatima Johnson, Solve Direct Electronics, +27 (0)82 450 5585, fatima@solvedirectelectronics.co.za

Cogiscan and Universal Instruments partner up

Cogiscan, a specialist track, trace and control (TTC) solutions provider for the electronics manufacturing industry, has signed an OEM reselling agreement with Universal Instruments to expand its portfolio of manufacturing solutions. Universal Instruments is a global leader in the design and manufacture of advanced automation and assembly equipment solutions.

Glenn Farris, vice president of marketing at Universal Instruments commented: "A key element of our Industry 4.0 strategy is to clearly define what core competencies we want to keep developing in-house, and where it makes more sense to partner with other industry leaders to complement our own solutions. Some of our customers expect a single source for complete manufacturing lines, including the different machines and the software to connect everything together.

"In addition, Industry 4.0 has significantly raised the bar of customer expectations for smart manufacturing. Moving forward, the key to success is collaboration and integration between best-of-breed technologies. Our past experience with Cogiscan has demonstrated that we can count on them to deliver reliable technology and outstanding customer support."

Cogiscan’s global director for equipment partnerships, Mitch DeCaire, stated that, “This is a very significant milestone in our long history of collaboration with Universal. The fact that they now integrate Cogiscan technology in their own product portfolio means that we have to always match the highest level of quality and responsiveness that their customers have come to expect. We take that responsibility very seriously.”

For more information contact Zetech, +27 (0)11 609 1244, zorlianski@zetech.co.za
**Reflow oven for high-volume production**

BTU International exhibited its new Pyramax Vacuum reflow oven at this year’s IPC APEX Expo. Designed around the requirements of large EMS/high-volume automotive customers, the unit is configured with 10 zones of closed-loop convection heating and a maximum production width of 45.72 cm.

Nitrogen atmosphere capable, the oven offers a maximum process temperature of 350°C. It features integrated controls with BTU’s proprietary Wincon Windows-based control system and full integration with factory MES/Industry 4.0 including vacuum parameters. Additional features include automatic sequencing, programmable control of vacuum level and hold time, and pass-through mode for non-vacuum operation. According to BTU, it is easy for existing Pyramax customers to transfer their process to the new oven.

For more information contact MyKay Tronics, +27 (0)11 869 0049, mykay@iafrica.com

**3D AOI system measures component height**

Saki’s BF-3Di is an automatic optical inspection (AOI) machine that not only performs inspection, but also provides measurements of each component for heights from 0 mm to 20 mm, with 1 micron height resolution.

Featuring an average takt time of just 18 seconds, the system is able to capture the most difficult defects, such as lifted leads, tombstones, reverses and height variations. The BF-3Di boasts a first pass yield higher than 95% or false-call rate of less than 100 ppm, and virtually zero escapes.

The proprietary offline programming software, BF-2 Editor software, fully emulates inspection conditions and provides real-time testing and verification of programming variables exactly as if the user were programming on the machine itself, thereby reducing programming and debug time and cost, while providing optimal inspection results.

Inspection data can be generated easily from CAD data in the same way as Saki’s 2D-AOI machines. As measurement is performed across a large area, a sample surface can be automatically detected and height zero reference points will be set automatically for each block area. By doing so, inspection library data can be easily added to necessary locations without being affected by adjacent components. The 3D machine also uses the same multiple-lighting technology as the 2D-AOI machines, and a variety of algorithms can be used based on the 2D-AOI experience.

For more information contact Techmet, +27 (0)11 824 1427, info@techmet.co.za
New capabilities at Omnigo

By Pieter de Nysschen, Omnigo.

Omnigo has grown tremendously of late, and to address this rapid growth the company had to make some astute equipment investment decisions. The specific niche market in the electronics contract manufacturer (ECM) industry that Omnigo serves, calls for high-quality product manufacturing, strong technical support and on-time delivery.

Since Omnigo has always been renowned for supplying high-quality manufacturing services, this was a key ingredient in the capital expenditure decisions the company had to make.

High-quality manufacturing

It is a fact of modern day society that technology is changing at a rapid rate – sometimes too fast for companies to adapt. Omnigo improved its surface mount technology (SMT) capabilities by adding three high-quality items to its manufacturing plant.

Two new Samsung pick-and-place machines were procured. The SM471 is a chip shooter capable of 75 000 component placements per hour to accurately and smoothly place 0402 sized components. The SM482, on the other hand, was acquired with flexibility in mind. Capable of placing odd sized components up to 55 mm ICs, the SM482 complements its almost twin brother well to ensure a fast and efficient lineup that can handle most challenges an ECM faces in modern times.

Speed and precision of placement are not the only important elements of a successful SMT line. The reflow oven is often a critical element in a SMT production line – mistakes here can be disastrous. The addition of a Vtronics Soltec Centurion CT720VP to the new production line was essential, as with its 7-zone preheat capability it eases the management of the reflow process with accurate profile prediction.

On the conventional manufacturing side, Omnigo procured an ERSA Versaflow 4/55 selective soldering machine. As is often the case with very complex PCB layouts, especially in the military market, flow soldering is impossible. This has an effect on throughput as well as repeatability of quality results. A selective soldering machine bridges the gap between hand soldering and wave soldering. Precise machine soldering nozzles that can accurately and consistently solder difficult items like military circular connectors ensure that a quality product is delivered within an acceptable time scale and cost.

Technical support

Omnigo invested in a GE Phoenix X|aminer X-ray machine during 2017. The rationale behind the procurement of this machine was from a quality assurance point of view as well as the ability to provide strong technical support to the company’s clients.

From a quality assurance point of view, an X-ray machine provides the opportunity to see concealed defects on manufactured PCB assemblies as well as blank PCBs and components. This includes the capability to inspect the quality of solder joints on bottom termination components, BGAs as well as flow through on through-hole components. The integrity to detect counterfeit components is enhanced through inspection of internal wire bonding of IC devices.

From a process point of view this enhances the ability to improve processes by identifying quality issues in-house; often these types of defects would only become apparent after a period of time. From a technical support perspective the X-ray machine assists in detecting flaws that might not be easily identified through testing equipment and visual inspection. The X-ray machine also allows the company to assist where clients encounter such problems, and help in analysing the X-ray images to identify issues on the PCB assembly to be repaired.

Omnigo also developed its own testing equipment in-house, using LabView platforms to do functional testing for its various clients’ products. This equipment can easily be adapted and duplicated to ensure sufficient throughput for higher quantities. Omnigo also provides this support to clients to assist with development of test equipment where the client might not have such capabilities themselves.

On-time delivery

The benefits of an ERP system are obvious to anyone, yet the importance of choosing the correct system and the implementation of such a system is key.

To maintain and improve further on the standard of service delivery Omnigo’s clients have grown accustomed, the company invested in SAP Business One as its ERP system.

This system, coupled with some specific add-ons, has ensured that Omnigo can continue to provide quality service to its clients through improved information availability. This system also enables Omnigo to track clients’ products through the various stages of production. The increased availability of information allows for improved production planning and allocation of resources to critical projects.

All these enhancements further Omnigo’s focus on providing high-quality manufacturing services to clients by “doing it right the first time.”

For more information contact Pieter de Nysschen, Omnigo, +27 (0)12 803 8218, pieterd@omnigo.co.za
3D printer for rapid prototyping and manufacturing

The new CEL RoboxPRO additive manufacturing 3D printer offers high-end specifications and exceptionally fast print speeds. The dual extrusion machine primarily targets professional users, including electronics and mechanical engineers involved in creating designs that require advanced rapid prototyping capabilities to quickly realise their product concepts in durable, engineering-grade materials with water-soluble support material.

A unique feature of the new RoboxPRO is the large interlocking door, designed to protect the printer’s fully enclosed build chamber with HEPA and active charcoal air filtration, which prevents unnecessary disturbance or damage to print builds in progress while ensuring users are not exposed to potentially toxic fumes. This important feature makes it highly suitable for professional or industrial environments and ideal for educational establishments such as universities, colleges or schools.

Using fused filament fabrication (FFF) 3D printing technology, a key differentiator of RoboxPRO is its patented needle-valve technology, which CEL claims makes the 3D printer the fastest and most efficient dual extrusion machine available. The dual-nozzle printing capability means the unit can print two different colours, two different materials or with a dedicated material supporting the main part, including water-soluble or breakaway.

Like the previous generation Robox 3D printers, RoboxPRO print heads are easily replaceable and can be upgraded to deliver extended and enhanced capabilities in the future, such as paste extrusion. The machine is designed for 1.75 mm filaments and is capable of printing a wide range of materials including PLA, ABS, PETG, TPU, PC and nylon.

RoboxPRO is also the first 3D printer to include an Olsson Ruby nozzle in the box. This is one of the most unique FFF extrusion nozzles currently available on the market, designed to print highly abrasive materials while retaining the excellent heat conductivity of brass. Its tip is made from ruby, which means that the nozzle is much more durable when compared to other nozzles. It can print with demanding, high-performance materials including Kevlar or tungsten-filled ABS and glass or carbon-filled nylons for a lot longer before it starts to wear away. In many cases, the ruby tip can also lead to an improved surface finish.

Other key specifications are the build volume of 210 x 300 x 400 mm and a wide choice of layer resolutions from 0.5 mm for ultra-fast printing, down to layers as small as 0.05 mm (50 microns). RoboxPRO uses onboard controls with an integrated, full-colour 5” touchscreen display interface to enable users to change print settings, make build-plate calibrations and manage its connectivity options, which include Wi-Fi, Ethernet and USB.

Other features of RoboxPRO include a climate-controlled build chamber, which features a HEPA filter and active charcoal air-purification system; adaptive bed levelling with no manual calibrations; an interchangeable, hassle-free build plate with no glue or tape required; and the Robox SmartReel material recognition system, which greatly simplifies the printing process with automatic print settings and job costings. RoboxPRO is compatible with other brands of filament, however, including Verbatim.

Compatible with Windows, Apple and Linux operating systems, RoboxPRO is also supplied with the intuitive Robox AutoMaker software.

For more information contact RS Components, +27 (0)11 691 9300, sales.za@rs-components.com
High-performance inertial sensing enables autonomous machines

By Bob Scannell, Analog Devices.

The automation of industrial machinery, whether it be in manufacturing, agriculture, logistics, energy, automotive or unmanned aerial vehicles, promises great gains in resource efficiency, equipment accuracy and safety.

A key enabler of these gains is the identification of the appropriate sensing technologies to enhance the contextual knowledge of the equipment’s condition. To the extent that the location or position of the equipment is also a valuable input to the equation, then precision inertial sensors hold the promise of essentially pinpointing location or maintaining accurate positioning.

Coupling both the location and the contextual sensor information is of substantial value in those applications where mobility is a factor. In many situations, the determination of position while operating in a complex or harsh environment is of especially critical value. This Internet of Moving Things (IoMT) has many challenges on the path to great efficiency gains, and high-performance inertial sensors are helping make the difference.

**Sensors propel machine automation**

As machinery has evolved from making simple passive measurements, to containing embedded control functions, and now on to fully autonomous operation, sensors are playing an enabling role. Whether for simple measurement supporting offline analysis, or for process control, many such sensors worked sufficiently in isolation.

The desire to extract real-time benefits, and the availability of an increasingly wide breadth of sensing types and efficient processing, has brought about important advances in sensor fusion to best determine context across multiple application and environmental states. Finally, in complex systems involving the interaction of multiple platforms and requiring knowledge of past system states, advances in connectivity are supporting increasingly intelligent sensor systems, as described in Table 1.

These intelligent and accessible sensor systems are revolutionising what would otherwise be mature industries, turning agriculture into smart agriculture, infrastructure into smart infrastructure, and cities into smart cities.

As sensors are deployed to gather relevant contextual information in these environments, new complexities arise in database management and communication, requiring sophisticated fusing not just from sensor-to-sensor, but across platforms and across time (as examples: cloud-based analytics of an infrastructures condition over time, last year’s crop yield, or traffic conditions and patterns), as shown in Figure 1.

In some cases, where mobility is important, geolocating this contextual sensor data is then required. In fact, little of the Internet of Things can be considered static. Equipment in factories, fields and hospitals is more useful when mobile, and an optical sensor on a geographically static piece of equipment is still likely locally mobile, requiring steering and pointing.

This Internet of Moving Things – Table 2 – fuses contextual and positional data, and essentially amplifies the usefulness of the data and the efficiency gains. As an example, for analysing yield enhancement opportunities, imagine the difference in relevance of knowing the temperature, moisture and precise location of an individually planted seed versus simply knowing the temperature and soil condition of a field of randomly planted seeds.

**Inertial sensors within smart machines**

Inertial sensors serve two primary functions within most smart machines; that of either equipment stabilisation and pointing, or navigation and guidance, as shown in Figure 2 (a separate and important use is for vibration analysis and condition monitoring, which is covered separately).

While GPS may be considered the navigational aid of choice for most systems due to its ubiquity, in some cases there are significant concerns to relying on GPS, primarily due to potential blockages. Transitioning to inertial

### Table 1. Sensor integration and connectivity levels.

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multisensors</td>
<td>Identification of multiple sensing types, to fit application need</td>
</tr>
<tr>
<td>Fused sensors</td>
<td>Using one sensor to correct another, or state driven hand off between sensors</td>
</tr>
<tr>
<td>Smart sensors</td>
<td>Localised, embedded processing, supporting real-time analysis, and decision</td>
</tr>
<tr>
<td>Connected sensors</td>
<td>Communication links support cross platform information sharing</td>
</tr>
<tr>
<td>Intelligent sensors</td>
<td>Leverage of information across time (for example: cloud, databasing) to adapt and learn</td>
</tr>
</tbody>
</table>

### Table 2. Accurate positioning coupled with context, enabling the Internet of Moving Things.

<table>
<thead>
<tr>
<th>IoT Contextual Sensors</th>
<th>Position Sensors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>Inertial</td>
</tr>
<tr>
<td>Optical</td>
<td>GPS</td>
</tr>
<tr>
<td>Chemical</td>
<td>Magnetometer</td>
</tr>
<tr>
<td>Gas</td>
<td>Barometer</td>
</tr>
<tr>
<td>Vibration</td>
<td>Ranging</td>
</tr>
<tr>
<td>Other</td>
<td>Other</td>
</tr>
</tbody>
</table>

### Table 3. Environmentally-challenged industrial applications pose challenging requirements to inertial sensors.

<table>
<thead>
<tr>
<th>Key Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centimetre level accuracy in midst of GSP blockage</td>
</tr>
<tr>
<td>Maintain accuracy even under vibration, temperature extremes, wind etc.</td>
</tr>
<tr>
<td>Reliable, safe operation, in all conditions</td>
</tr>
</tbody>
</table>

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Dataweek, 21 March 2018

www.dataweek.co.za
sensing during a GPS blockage is effective, but only assuming the inertials are of sufficient quality to provide adequate precision for the duration of the outage. In the case of a stabilization or servo loop, inertial sensors may be relied on in the feedback mechanism, to maintain a reliable pointing angle of an antenna, crane platform, construction blade, farming implement, or camera on a UAV.

In all of these examples, the purpose goes beyond providing a useful feature (for example, gesture control in a mobile phone), to delivering critical accuracy or safety mechanisms, in the midst of incredibly difficult environments (see Table 3).

**Sensor quality matters**

There is a myth, or perhaps dream, that sensor fusion algorithms can be used to essentially code good performance into otherwise marginal sensor technology. Sensor fusion can be used for some corrections – for instance, a temperature sensor to correct for temperature drift of another sensor, or an accelerometer (G) sensor to correct for gravitational effect on a gyroscope.

Even in these cases, this actually only calibrates the given sensor to the environment. It does not improve its inherent ability to maintain performance between calibration points, it only interpolates it. A poor quality sensor typically drifts rapidly enough that without extensive or expensive calibration points, accuracy falls off quickly.

Nevertheless, some amount of calibration is typically desired, even in high-quality sensors, in order to extract the highest possible performance from the device. The most cost-effective approach to doing this is dependent on the intricate details of the sensor and a deep knowledge of the motion dynamics (see Figure 3, page 31), not to mention access to relatively unique test equipment. For this reason, the calibration and compensation step is increasingly seen as an embedded necessity from the sensor manufacturer.

A second significant step in the path of converting basic sensing outputs into useful application-level intelligence is state driven sensor hand-off. This requires expansive knowledge of the application dynamics, as well as the capabilities of the sensors, in order to best determine which sensor can be relied on at any given point in time.

A conceptual example of the role of sensor fusion in an industrial application is illustrated in Figure 4 (page 31). Here, for a precision driven industrial application, a careful selection of sensors has been done to support an expected need to operate within high potential GPS blockages, potentially difficult magnetic fields and other environmental disturbances. For this reason, the infrastructure-free nature of inertial sensors is most heavily relied on, with other sensing aids chosen to support specific environmental challenges, and to help correct for any long-term inertial drift.

While it is preferable to plan sensor selection to allow precise tracking under all conditions, this is practically impossible. Thus, the small segment of uncertainty is still retained in the scenario planning. The algorithms exist for valuable sensor calibrations, as well as to manage the sophisticated sensor-to-sensor hand-off, driven by the application state. Ultimately, the end application will dictate the level of accuracy required, and the quality of sensor chosen will determine whether this is achievable.

Table 4 (page 30) contrasts two scenarios, illustrating the significance of sensor choice to not only the design process, but to the equipment precision. A low-precision sensor may in fact be suitable if it is only to be relied on in limited instances, and if the application has tolerance for error. In other words, if it is not safety or life critical, its relatively imprecise accuracy is good enough.
Table 5. Industrial MEMS devices offer extensive characterisation of all known potential error sources, and typically achieve order of magnitude or better precision.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Typical Industrial Specification</th>
<th>Units</th>
<th>Delta Improvement Over Typical Consumer Device</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gyrosopes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dynamic Range</td>
<td>Up to 2000</td>
<td>°/sec</td>
<td>~</td>
</tr>
<tr>
<td>Noise Density</td>
<td>0.004</td>
<td>°/sec / √Hz rms</td>
<td>2x</td>
</tr>
<tr>
<td>Angular Random Walk</td>
<td>0.2</td>
<td>°/√Hr rms</td>
<td>2x</td>
</tr>
<tr>
<td>In-run Stability</td>
<td>5</td>
<td>°/hr</td>
<td>3x</td>
</tr>
<tr>
<td>Bias Repeatability</td>
<td>0.2</td>
<td>°/sec</td>
<td>100x</td>
</tr>
<tr>
<td>-3 dB Bandwidth</td>
<td>465</td>
<td>Hz</td>
<td>2x</td>
</tr>
<tr>
<td><strong>Accelerometers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dynamic Range</td>
<td>Up to 40</td>
<td>g</td>
<td>3x</td>
</tr>
<tr>
<td>Noise Density</td>
<td>25</td>
<td>micro-g/√Hz rms</td>
<td>10x</td>
</tr>
<tr>
<td>Velocity Random Walk</td>
<td>0.03</td>
<td>m/s/√Hr</td>
<td>10x</td>
</tr>
<tr>
<td>In-run Stability</td>
<td>10</td>
<td>micro-g</td>
<td>10x</td>
</tr>
<tr>
<td>Bias Repeatability</td>
<td>25</td>
<td>mg</td>
<td>100x</td>
</tr>
<tr>
<td>-3 dB Bandwidth</td>
<td>500</td>
<td>Hz</td>
<td>2x</td>
</tr>
<tr>
<td>Axial Alignment</td>
<td>0.05</td>
<td>deg</td>
<td>20x</td>
</tr>
<tr>
<td>Linear Acceleration Effect</td>
<td>0.01</td>
<td>°/sec/g</td>
<td>10x</td>
</tr>
<tr>
<td>Vibration Rectification</td>
<td>0.004</td>
<td>°/sec/g</td>
<td>10x</td>
</tr>
<tr>
<td>Sensitivity Tempco</td>
<td>25</td>
<td>ppm/ °C</td>
<td>10x</td>
</tr>
<tr>
<td>Bias Tempco</td>
<td>0.007</td>
<td>°/s/ °C</td>
<td>10x</td>
</tr>
</tbody>
</table>

Though most consumer level sensors have low noise and perform adequately in benign conditions, they are not suitable for machinery subject to dynamic motion, including vibration, which in a low-performance inertial measurement unit cannot be separated from the simple linear acceleration or inclination measurement that is desired.

To achieve accuracy of better than one degree while operating in an industrial environment, the selection focuses to sensors that are designed specifically to reject error drift from vibration or temperature influences. Such a high-precision sensor is then capable of supporting a larger span of the expected application states, and over longer time periods.

**High-performance inertials**

Designing for performance does not have to be exclusive of designing for efficiency in cost, size and power. However, designing a MEMS structure with a primary goal of cost reduction will typically sacrifice performance, sometimes significantly. Some simple choices for reducing cost, such as less silicon mass and plastic encapsulated consumer packaging, are largely detrimental to MEMS performance.

Extracting accurate and stable information from a microelectromechanical device, such as the one illustrated in Figure 5, requires strong signal-to-noise driven by silicon area and thickness, as well as minimised stress imposed on the silicon, from the selection of component packaging through to system-level enclosures. With end use performance requirements in mind at the onset of the sensor definition, the silicon, integration, packaging, and test and calibration approaches can be optimised to maintain native performance, even under complex environments, and to minimise cost.

Table 5 shows performance demonstrated in a mid-level industrial device, in comparison to a typical consumer sensor, which may be found in a mobile phone (note that higher-end industrial devices are also available, which are an order of magnitude better than those shown). Most low-end consumer devices do not provide specifications for parameters such as linear acceleration effect, vibration rectification, angular random walk and others, which can actually be the largest error sources in industrial applications.

This industrial sensor is designed for use in a scenario anticipating relatively rapid or extreme movement (2000 °/sec, 40 G), where a wide-bandwidth sensor output is also critical to enable best discrimination of signal. Minimum drift of offset during operation (in run stability) is desired to reduce the reliance on a larger suite of complementary sensors to correct performance, and in some cases, minimisation of turn-on drift (repeatability) is critical in applications that cannot afford the time required for back-end system filtering corrections. Low-noise accelerometers are used in cooperation with gyroscopes to help distinguish and correct for any G-related drift.

The gyroscope sensors have actually been designed to directly eliminate the effect of any
Jitter = RSS of Noise + Vibration + Cross Axis Sensitivity

Assumptions: 50 Hz BW, 2 g-rms vibration, 100 o/s off axis rotation
*Best-case: does not include other drift factors

Table 6. In dynamic motion, linear-G and alignment become dominant error sources. Industrial devices balance all specifications for low overall error.

<table>
<thead>
<tr>
<th>Key Specifications of Example IMUs</th>
<th>Industrial</th>
<th>Consumer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance</td>
<td>Spec</td>
<td>Impact</td>
</tr>
<tr>
<td>Noise Density (°/sec/√Hz)</td>
<td>0.004</td>
<td>0.036</td>
</tr>
<tr>
<td>Linear-g (°/sec/g)</td>
<td>0.01</td>
<td>0.20</td>
</tr>
<tr>
<td>Cross Axis (%)</td>
<td>0.099%</td>
<td>0.099%</td>
</tr>
<tr>
<td>Projected Error (°/sec)</td>
<td>0.099</td>
<td>2.012*</td>
</tr>
</tbody>
</table>

Assumptions: 50 Hz BW, 2 g-rms vibration, 100 o/s off axis rotation
*Best-case: does not include other drift factors

Continued on page 32
The Phoenix Contact range now includes the first push-pull circular connectors with cross-manufacturer connection-compatible fast locking system. The M12 female connectors for direct PCB connection are available as one-piece versions for wave soldering (A- or D-coded), as two-piece versions for reflow soldering (A-, D- or X-coded), and as litz wire versions (A- or D-coded).

On the field side, the range is rounded out by the respective connectors for assembly in either a straight or angled design. Thanks to the push-pull fast locking system, the connectors latch into place quickly and securely with a click. The connector springs back if it is not correctly latched into place, thus giving the user clear feedback.

The connection compatibility ensures superior availability worldwide and enables the easy extension of existing cabling concepts. The 360° overall shielding braid ensures interference-free transmission, even under extreme mechanical stress such as shock or vibration. The circular connectors are thus particularly well suited for applications in the rail industry.

For more information contact Richard Schoonebeek, Phoenix Contact, +27 (0)11 801 8200, rschoonebeek@phoenixcontact.co.za

For more information contact Andrew Athanasiou, Arrow Altech Distribution, +27 (0)21 555 1884, aathanasiou@arrow.altech.co.za

**M12 circular connectors with push-pull locking**

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For more information contact Richard Schoonebeek, Phoenix Contact, +27 (0)11 801 8200, rschoonebeek@phoenixcontact.co.za

**For more tolerance**

**Tolerance-compensating M12 screw connection.**

Mount M12 connections quickly and safely:

The new IP67 housing screw connection M12 VARIOPORT automatically compensates for production tolerances of up to 1 mm on housing boreholes and PCBs. Mount the M12 screw connection, join the M12 contact carrier and screw connection, lock the M12 device connection - done.

For more information:

JHB: 011 801 8200  CT: 021 930 9666
DBN: 031 701 2701  PE: 041 364 0415
www.phoenixcontact.co.za
RS signs new agreement on industrial components

RS Components has announced a distribution agreement with IDEC EMEA, a leading manufacturer of industrial automation and control products. The recently signed deal between the two companies builds upon the longstanding relationship between APEM and RS, following the acquisition of the APEM group by IDEC EMEA in March 2017. RS is the first distributor in Europe to stock the IDEC range, which will initially include more than 1000 part numbers available to RS customers with more to follow in the coming months. The launch includes more than 700 new industrial control switches with both 16 mm and 22 mm diameters, as well as safety switches, enabling switches, safety laser scanners, power supplies and industrial LED lighting products.

“APM has been a longstanding partner of RS and welcomes the opportunity to develop its business and relationship following the IDEC acquisition,” said Eric Smith, vice president, interconnect and electromechanical at RS. “The high-quality industrial nature of the IDEC product range will resonate well with our core customers across all markets.”

For more information contact RS Components, +27 (0)11 691 9300, sales.za@rs-components.com

PSUs for industrial and railway use

With the PCMAT150 S24, MTM Power has introduced a new generation of AC-DC modules which can be installed as a decentralised power supply for industrial and railway applications. From wide AC (85 – 264V) or DC (100 – 300V) input ranges for worldwide use in industrial networks, a 24 V d.c. output voltage is generated. The contact-cooled devices have a power-good signal as well as active power factor correction. Further features are an operating temperature of -40°C to +70°C, remote control and 150% power boost.

The design of the isolation system according to over-voltage category OV 3 enables use in applications with high transients, such as in energy technology. For use on rail vehicles, the devices were tested according to the standards of EN 50155 and EN 50121-3-2/EN 50121-4. In compliance with the conditions of the railway regulations, the units can be used on railway vehicles on the 400/230 V a.c. internal on-board train power system, in track-side applications and in stationary railway systems.

The PCMAT150 has an efficiency of 92,5% and is resistant against shock and vibration due to the well-proven encapsulation technology and its extremely rugged design. The vacuum encapsulated power supplies offer reliable protection against condensation, conductive dust and other environmental conditions.

They are connected via industrial connectors which meet the demands concerning vibration resistance, reduced wiring time and being maintenance-free, and thus their use as a plug-and-play solution in sensitive electronic subsystems is possible. Due to the rugged design in BPC technology, the thermal losses are dissipated specifically via the mounting plate while increasing the lifetime of the devices at the same time.

For more information contact Vepac Electronics, +27 (0)11 454 8053, sales@vepac.co.za

Positioning technology for industrial and automotive markets

u-blox has announced its F9 technology platform, delivering high-precision positioning solutions for mass market industrial and automotive applications. The platform combines multi-band global navigation satellite system (GNSS) technology with dead reckoning, high-precision algorithms and compatibility with a variety of GNSS correction data services to achieve precision down to the centimetre level. The company sees F9 as paving the way for the next generation of high-precision navigation, augmented reality and unmanned vehicles.

The platform will underpin the next wave of u-blox positioning modules targeting mass market industrial and automotive applications. It uses GNSS signals in multiple frequency bands (L1/L2/L5) to correct positioning errors caused by the ionosphere and deliver fast time to first fix (TTFF). Its ability to receive signals from all GNSS constellations (GPS, GLONASS, Galileo, Beidou) further improves performance by increasing the number of satellites that are visible at any given time.

Standalone u-blox F9 solutions robustly achieve metre-level accuracy, but to achieve centimetre-level accuracy, the platform offers optional on-chip real-time kinematic (RTK) technology. In addition to offering an open interface to legacy GNSS correction service providers, it supports the main GNSS correction services, taking RTK high-precision positioning to mass markets.

Optimised for low power consumption, the u-blox F9 platform sets a high standard for security with built-in jamming and spoofing detection systems that protect against intentional and unintentional interference. Dead reckoning technology based on inertial sensors extends high-precision performance to otherwise challenging urban environments.

Automotive applications of the technology include lane level navigation for head-up displays and vehicular infotainment systems, as well as for vehicle-to-everything (V2X) communication, a prerequisite for highly automated and fully autonomous vehicles.

In the industrial realm, u-blox F9 will enable mass adoption of commercial unmanned vehicle applications including drones and ground vehicles such as heavy trucks or robotic lawn mowers.

For more information contact Andrew Hutton, RF Design, +27 (0)21 555 8400, andrew@rfdesign.co.za
Aluminium profile enclosures

The new Smart-Terminal aluminium profile enclosures from OKW feature a high-quality matt anodised finish. These robust, attractive cases offer plenty of space for large-volume electronic assemblies, for example touch screens, display modules, PCBs etc. They present a variety of technical advantages, individual profile lengths on request, and creative designer options for tough industrial display enclosures.

Three basic enclosures are available in the profile lengths 160 mm, 200 mm and 240 mm (covers add 42 mm to overall length), with a width of 170 mm and height of 50 mm. The covers come in lava colour (similar to anthracite) moulded in high-quality ASA+PC-FR plastic, with designer seals made of TPV material in volcano or green.

Their highly versatile design can be used for table-top, sloping front and wall-mounted enclosures. A recessed area in the top allows for the installation and protection of displays, membrane keypads and operating elements; the recessed area measures 14 cm on the diagonal for the Smart-Terminal 160 and 17.8 cm for the Smart-Terminal 200 and 240. Horizontal PCB guides and screw channels are provided inside the enclosure.

The two-part aluminium profile facilitates the assembly of the enclosure and installation of the components, with no visible fixing screws, while flat areas facilitate easy installation of the interfaces and side covers have a recessed area to protect the cables and connectors. Optional accessories include a wall suspension element, case canting kit for an ergonomic reading angle of 12°, and a set of square-head nuts for PCB mounting.

For more information contact
Pieter Engelbrecht, Avnet South Africa,
+27 (0)11 319 8600,
pieter.engelbrecht@avnet.com

19” rack mount and standalone power distribution strips

Hammond Electronics has extended its power distribution offering with an additional 12 variants of rack mounting and stand-alone 100 – 240 V a.c., 50/60 Hz, 10 A power strips, designed for use with IEC power cords. The new units further extend Hammond’s comprehensive range of 19” rack accessories such as thermal management products, power distribution units, shelves, panels, cable management, ground kits, feet and castors.

For enhanced safety, two 10 A resettable circuit breakers prevent overloading, and both types are available with either a double-pole single-throw green illuminated on/off switch or as a basic unswitched version with a green power-on indicator light. All are fitted with an IEC320 C14 inlet plug and multiple IEC320 C13 outlet sockets, making them suitable for use anywhere.

The 1U rack mount units offer eight front- or rear-facing outlet sockets. The standalone versions are available with four, five, six or eight top-mounted outlets. The 1U rack mount units are housed in a black powder coated steel enclosure, and the standalone versions in an extruded aluminium case with a black powder coated steel cover. All versions are TÜV, cULus and CAN/CSA certified to IEC 60950-1 and are CE compliant to the EU low voltage directive 2014/35/EU.

For more information contact Communica,
+27 (0)12 657 3500, sales@communica.co.za
Protection of electronic equipment varies depending on the application and the requirements. Pentair offers a wide range of solutions, from aesthetically pleasing, functional and simple electronics cabinets to high-frequency shielded, shock and vibration protected versions, with flexible Schroff Varistar and Schroff Novastar cabinet platforms and an extensive selection of accessories.

In addition to the range of standard cabinets, all Schroff cabinets can be individually configured to specific applications by combining off-the-shelf components. Customers can choose from more than 100 standard cabinet dimensions and a wide selection of accessories and modifications, including additional cut-outs (e.g. for fans or connectors) and special colours. If customer requirements cannot be met by combining or modifying standard components, both modular cabinet platforms provide the basis for customised 19" cabinets.

Novastar is a screw-assembled 19" aluminium frame platform offering slim cabinets only 553 mm wide. Visible uprights with a T-groove are provided to mount accessories on the frame, and inset cladding components boast an innovative quick-release fastening system. The system can be configured for standalone, side-by-side and/or stacked solutions.

For extra stability up to 1600 kg static load and mechanical stability to earthquake zone 4 in accordance with IEC 61587-2, the Varistar platform provides up to IP55 and HF-shielding directly through the cladding to achieve performances of 60 dB at 1 GHz and 40 dB at 3 GHz. Variable cooling concepts are catered for with integrated air to water heat exchangers up to 40 kW cooling capacity.

For more information contact Actum Electronics, +27 (0)11 608 3001, sales@actum.co.za.

Flexible 19” electronics cabinet platforms

Electronics housings for Raspberry Pi

Phoenix Contact is introducing a new housing for Raspberry Pi minicomputers to the market. The UCS-RPI series rounds out the product range of universal electronics housings and protects Raspberry Pi B2 and B3 models against mechanical and physical influences.

These light grey or black housings with IP40 degree of protection are available in the sizes 125 x 87 mm and 145 x 125 mm. Their inter-changeable side panels are factory-equipped with knockouts for standard Raspberry Pi module connections. Thanks to the convenient mounting accessories, these housings are suitable for use on desks, walls, or DIN rails.

For more information contact Richard Schoonebeek, Phoenix Contact, +27 (0)11 801 8200, rschoonebeek@phoenixcontact.co.za.

Enclosure front-panel customisation service

Pentair offers a wide choice of front panels and plug-in units for all kinds of electronics applications, and complements this with Front Panel Express, a rapid customisation service for all 19" and standard Schroff panels. It is designed to speed up production programmes and provides a perfectly customised product with only a dimensioned drawing required.

The customisation service entails a simple three-step process. The first step is product selection, giving customers a choice of front panels and plug-in units, all available from stock. Variable dimensions are available, from 2U to 9U and from 2 HP to 84 HP, and different surfaces and finishes can be chosen. The product selection conforms to VME, CompactPCI, AdvancedTCA and MicroTCA specifications.

The second step is modification, whereby 2D and 3D CAD data is available for download, in addition to a CAD library of cut-outs for connectors. The customer can then simply upload their customised CAD file including holes, cut-outs, printing, surface finishes or shielding.

Finally, the third step is assembly, at which stage a large range of lever and static handles is available. Other choices offered to the customer include textile or stainless steel EMC shielding, a choice of sleeves and screws, and complete front panel kits with handles or individual components. Pentair also offers a full assembly service.

For more information contact Actum Electronics, +27 (0)11 608 3001, sales@actum.co.za.

www.hammondmfg.com
Forbatt’s FB9-12 is a sealed lead-acid battery designed and manufactured specifically to meet the demands of the uninterruptible power supply (UPS) market. With a nominal voltage of 12 V and rated capacity (20 hour rate) of 9 Ah, the battery maintains a compact form factor with dimensions of 151 mm (length) x 65 mm (width) x 94 mm (height) and weighing 2.4 kg. The FB9-12 has excellent self-discharge characteristics, it maintains a capacity of 90% after 3 months storage, 80% after 6 months and 60% after 9 months. Assuming temperature conditions are optimal, it will provide a service life of up to 5 years in trickle/float operation and a cycle life of up to 700 cycles provided it is not discharged below 40%.

According to Johnson Fang of Forbatt SA, the FB9-12 is a powerful complement to the 7 Ah model, which is highly popular and well established in UPS applications. By adopting the same physical dimensions, the 9 Ah model provides a longer backup time in the event of a power failure, yet with the same space requirements.

Underwater connectors, custom high-pressure cable assemblies and connector terminations are included among Glenair’s range of specialised solutions. Depth rated to 10 000 psi (700 bar) for naval and defence, deep-sea oil and gas industry and oceanographic applications, the products are also applicable to downhole, high-pressure and above-deck shipboard interconnect solutions. Underwater dry-mate fibre-optic and high-speed electric solutions with 10 000 psi pressure ratings are also available.

Backed by an engineering team comprised of industry experts with extensive knowledge and experience in the subsea industry including submarines, ROV/AUV, seafloor operations, geophysical and entertainment projects, Glenair manufactures several complete lines of oil filled (PBOF) and depth-rated cable assemblies for deep-sea applications.

Both the SeaKing and SuperG55 series connectors incorporate numerous design improvements that improve service life, safety, reliability and ease of assembly. Both connector series take advantage of reliability and test standard disciplines developed by Glenair over the past 60 years in the mission-critical aerospace industry. SeaKing connectors, for example, are 100% inspected and tested in a state-of-the-art hydrostatic test lab via a formalised qualification test plan model that includes combined testing across pressure, durability, shock, salt spray corrosion as well as other stress factors.

Vishay recently introduced a new 1 A integrated power phototriac designed to directly drive medium AC loads. Featuring high dv/dt to 600 V/µs, the VO2223B delivers high robustness and noise isolation for home appliances and industrial equipment.

The device consists of an optically coupled phototriac driving an integrated power TRIAC in the compact DIP package. Without the need for an external power TRIAC, the VO2223B reduces design costs and saves board space. These benefits are magnified by its high dv/dt, which enhances safety margins to eliminate requirements for expensive snubber networks.

The power phototriac features a high blocking voltage of 600 V to permit control of off-line voltages up to 240 V a.c., and is sufficient for as much as 380 V a.c. For additional safety, the device offers an input-to-output isolation voltage of 5300 V. A low 10 mA maximum input trigger current facilitates an easy interface with digital logic.

Optimised for noisy environments, typical applications for the VO2223B include fan motor, valve and pump control in air conditioners, refrigerators, water heaters, washing machines and oven ranges, as well as smart home thermostats, intelligent light controllers, floor heating systems and magnetic door controls.

Offering pure tin leads, the device is RoHS-compliant.
EMC filters for single-phase applications

Schaffner’s popular single-phase EMC filter portfolio has been extended by additional high-performance versions of the filter family FN 2070. Designed to meet the highest performance demands for single-phase filters, the new parts were developed to fit the existing housing sizes.

Together with the already introduced extensions to the FN 2010, FN 2030 and FN 2090 series, the FN 20XX family offers the most compact, highest-performance chassis mount filters ever introduced by Schaffner. The filters have all the required safety approvals and are compatible with the RoHS directive.

For more information contact Deon Schoombee, Electrocomp, +27 (0)11 485 9000, deon@electrocomp.co.za.

Steering diode/TVS arrays

ProTek Devices has added two steering diode/ transient voltage suppressor (TVS) arrays that provide circuit protection for a wide variety of applications, such as telecommunications interfaces, computing interfaces, video cards and more. One of the new devices can also be used to guard against electromagnetic interference / radio frequency interference.

The PLR4045 provides ultra-low capacitance of 1.6 pF while delivering circuit protection for critical applications. These applications include 2.5GBASE-T, T1/E1 and T3/E3 chip-side protection, DVI interfaces and USB 2.0 interfaces. It is rated at 600 Watts peak pulse power (8/20 microseconds waveform).

At higher operating frequencies, or faster edge rates, insertion loss and signal integrity are a major concern. The PLR4045, in conjunction with passive components integrated into a TVS / filter network, can be used for EM/RFI protection. ESD protection is > 25 kV. The device also offers unidirectional configuration, a low clamping voltage of 20 V at IPPM = 30 A, and protects four I/O ports and a power supply.

The PSRV2.8-2LC is an addition to the PSRV-2LC series of low-capacitance (1 pF typical) steering diode /TVS arrays, and offers a 2.8 V rated standoff voltage. The component is ideal for circuit protection in Ethernet 10/100/1000 Base T, USB, handheld electronics, video cards, WAN/LAN and similar equipment. This series is designed to protect two line pair or four data / transmission lines from the effects of ESD and EFT.

The PSRV2.8-2LC is ideal for low-voltage circuit applications and the low capacitance of the steering diode allows the designer to protect high-speed data applications. This device is compatible with IEC standards 61000-4-2 (ESD): air: ±15 kV, contact: ±8 kV; 61000-4-4 (EFT): 40 A; 5/50 ns, and 61000-4-5 (surge): 24 A, 8/20 microseconds, level 2 (LineGnd) and level 3 (Line-Line). It features 300 Watts peak pulse power per line (typical = 8/20 microseconds), and provides two lines of protection and low leakage current of less than 1,0 µA.

For more information contact Jeva Narian, Arrow Altech Distribution, +27 (0)11 923 9600, jnarian@arrow.altech.co.za.

SMT micro-SPDT relay

A new generation of SMT micro-SPDT relay has been introduced by Radiall, with performance up to 26.5 GHz for high-frequency applications where space is limited. To overcome the frequency limits of SMT switches, the company has merged its Ramses concept with the Slim Line technology to develop the Quartz series.

This new series is a major evolution when compared to the previous SMT relay and offers a higher frequency range, excellent reliability, hermeticity and thermal resistance, and a longer life span (3 million cycles guaranteed).

For more information contact Hiconnex, +27 (0)12 661 6779, info@hiconnex.co.za.

www.dataweek.co.za
Software-defined antenna increases throughput

Taoglas and Adant partnered up to announce the launch of Taoglas Shift at Mobile World Congress 2018. The software-defined antenna system aims to change the economics of next-generation wireless networks by extending coverage and increasing throughput by up to 100%, according to Taoglas.

Using Adant’s advanced beam-steering technology, the antenna dynamically adapts its radiation pattern in real-time to increase the link quality and deliver the best signal propagation and reception for mobile and stationary applications, both indoors and outdoors, in industries such as retail, agriculture, transportation and others.

The Taoglas Shift antenna intelligently seeks out and finds the best signal on a regular basis, and then tunes the antenna in real-time to achieve the highest throughput – reducing the need for redundant carriers to ensure strong coverage. The antenna and LTE module are combined in a single enclosure for fast solution deployment.

The antenna’s directional beams help mitigate interference from other co-located users, while its high gain helps increase signal-to-noise ratio, improving link reliability in the desired direction and also extending coverage. Use of spatial multiplexing in 2x2 MIMO linearly increases throughput by switching to the most optimal antenna configuration, Total Radiated Power (TRP) and Total Isotropic Sensitivity (TIS) of more than 3 dB is achieved with respect to a static omnidirectional antenna system of comparable size.

For more information contact Andrew Hutton, RF Design, +27 (0)21 555 8400, andrew@rfdesign.co.za.

Board mounted pressure sensor

Honeywell’s MPR series is a very small piezoresistive silicon, board mounted pressure sensor, designed with the features and price to meet the requirements of higher-volume medical (consumer and non-consumer) devices and commercial appliances.

The sensor has a 5 x 5 mm package footprint and is fully calibrated and compensated, providing a digital output for ease of implementation into an end product. It has liquid media capability for challenging applications such as liquid level measurement and is available with a food grade option for applications requiring food grade or drinking water certification.

The MPR series measures pressures from 4 kPa to 250 kPa, and sends the reading to a 24-bit digital I2C- or SPI-compatible output. It features low power consumption of <10 mW typical and a compensated temperature range of 0°C to 50°C.

For more information contact TRX Electronics, +27 (0)12 997 0509, info@trxelectronics.com.

Abracon components available through RS

RS Components has signed a franchise agreement with Abracon, a leading global manufacturer of frequency control, timing, synchronisation, RF, connectivity and power components destined for deployment in markets such as industrial, communications and automotive, as well as the emerging generation of IoT applications.

Key advanced technologies for Abracon include advanced design, simulation and testing of Pierce oscillators and RF antenna systems. Able to diagnose in-circuit performance of crystals in low-power IoT devices, the Pierce oscillator system (PAS) test service exposes design flaws before they impact the application’s reliability.

Antenna tuning services complement Abracon’s advanced electromagnetic simulation and design capabilities to provide customers with a fast track to market in complex RF and wireless designs.

For more information contact RS Components, +27 (0)11 691 9300, sales.za@rs-components.com

High-temperature MOSFETs

Taiwan Semiconductor has introduced new 40 V and 60 V N-channel MOSFET families with a rated junction temperature of 175°C. The parts feature logic or standard gate threshold voltage levels, and a wide range of RDS(on) levels for flexible and robust power switching designs.

Qgd/Qgs and Qrr parameters have been optimised to improve figure of merit and reduce electromagnetic interference (EMI). The MOSFETS are packaged in a small form factor PDFN56 package for improved power density. They exhibit high surge current capability during cold load startup and in-rush.

For more information contact Callie Lombard, Hi-Q Electronics, +27 (0)11 894 8083, callie@hi-q.co.za.
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To meet growing connectivity needs for buildings, factories and the grid, Texas Instruments introduced new SimpleLink wireless microcontrollers (MCUs) offering low power consumption and concurrent multi-standard and multi-band connectivity for Thread, Zigbee, Bluetooth 5 and Sub-1 GHz. With more memory and connectivity options, the expanded SimpleLink platform offers designers 100% code reuse across TI’s Arm Cortex-M4-based MCUs to enhance and connect sensor networks to the cloud. The devices can operate for more than 10 years on a coin-cell battery, and offer a newly enhanced low-power sensor controller with current consumption as low as 1.5 µA for a 100 Hz comparator reading.

EBV Electrolink, +27 (0)21 402 1940.

Multi-standard wireless MCUs

Applications for Maxim Integrated Products’ MAX12900 4 – 20 mA sensor transmitter include industrial automation and process control, loop-powered 4 – 20 mA current transmitters, remote instrumentation and smart sensors. It increases system accuracy with 10 ppm/°C voltage reference and packs 10 optimised building blocks into its 5 x 5 mm package. The integration of a high-voltage LDO and power sequencing capability simplifies the powering up of the 4 – 20 mA sensor transmitter. Its reduced current consumption for low power requires just 250 µA of current maximum, and it enables system cost savings by converting pulse width modulation data from a microcontroller into current over a 4 – 20 mA loop with two-, three- or four-wire configurations.

CST Electronics, +27 (0)11 608 0070.

4 – 20 mA sensor transmitter

Nordic Semiconductor’s nRF9160 is making the latest LTE technology accessible for a wide range of applications and developers. By integrating an application MCU, full LTE modem, RF front end and power management in a 10 x 16 x 1,2 mm package, it also offers one of the most compact solutions for cellular IoT on the market. Targeting asset tracking applications, the nRF91 SIP (system-in-package) series includes a variant with built-in GPS support, which combines location data from the cellular network with GPS satellite trilateration to allow remote monitoring of the device position. The nRF9160 offers an ARM Cortex M33 processor with on-chip Flash and RAM exclusively for application use.

RF Design, +27 (0)21 555 8400.

Wi-Fi modules and transceivers

Silicon Labs has introduced a new Wi-Fi portfolio to simplify the design of power-sensitive, battery-operated Wi-Fi products including IP security cameras, point-of-sale (PoS) terminals and consumer healthcare devices. Optimised for energy efficiency, the WF200 transceivers and WFM200 modules support 2,4 GHz 802.11 b/g/n Wi-Fi with transmit and receive current consumptions of 138 mA and 48 mA, respectively. The devices have a link budget of 115 dBm for long-range transmissions, and are optimised for antenna diversity and wireless coexistence in crowded 2,4 GHz environments. They come in a 4 x 4 mm QFN32 transceiver package and a 6,5 x 6,5 mm LGA52 SiP (system-in-package) module.

NuVision Electronics, +27 (0)11 608 0144.

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SiP for LTE-M and NB-IoT

The AX−SIP−SFEU from ON Semiconductor is an ultra low-power, compact system-in-package (SiP) solution for a node on the Sigfox network, with both up- and down-link functionality. Delivered with conformal shielding, the chip contains all the necessary components and firmware for transmit and receive operation on the RC1 Sigfox network – no additional passive components or reference frequency providing parts are required on the customer’s PCB. A single-ended 50 Ω antenna port is provided. The device is targeted at building and home automation, automatic meter reading, sensor and asset tracking, and control and lighting.

Arrow Altech Distribution, +27 (0)11 923 9600.

Sigfox transceiver

Winbond Electronics unveiled a new class of NAND Flash ICs which offers high quality and long data retention suitable for use in mission-critical code storage applications at densities of 512 Mb (64 MBytes) and above. The automotive-grade SLC (single-level cell) serial NAND Flash parts are guaranteed to have no bad blocks on shipment and for up to 100 program/erase cycles – sufficient for code storage applications, which perform a limited number of program and erase operations. In addition, they support 25 years’ data retention at an operating temperature of 85°C in cells subject to up to 100 cycles.

KH Distributors, +27 (0)11 854 5011.

Automotive-grade NAND Flash

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RF Design, +27 (0)21 555 8400.

4 – 20 mA sensor transmitter

Silicon Labs has introduced a new Wi-Fi portfolio to simplify the design of power-sensitive, battery-operated Wi-Fi products including IP security cameras, point-of-sale (PoS) terminals and consumer healthcare devices. Optimised for energy efficiency, the WF200 transceivers and WFM200 modules support 2,4 GHz 802.11 b/g/n Wi-Fi with transmit and receive current consumptions of 138 mA and 48 mA, respectively. The devices have a link budget of 115 dBm for long-range transmissions, and are optimised for antenna diversity and wireless coexistence in crowded 2,4 GHz environments. They come in a 4 x 4 mm QFN32 transceiver package and a 6,5 x 6,5 mm LGA52 SiP (system-in-package) module.

NuVision Electronics, +27 (0)11 608 0144.

Automotive-grade NAND Flash

Winbond Electronics unveiled a new class of NAND Flash ICs which offers high quality and long data retention suitable for use in mission-critical code storage applications at densities of 512 Mb (64 MBytes) and above. The automotive-grade SLC (single-level cell) serial NAND Flash parts are guaranteed to have no bad blocks on shipment and for up to 100 program/erase cycles – sufficient for code storage applications, which perform a limited number of program and erase operations. In addition, they support 25 years’ data retention at an operating temperature of 85°C in cells subject to up to 100 cycles.

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