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The weather is cold, and load shedding has been limited. But the real issue relates not so much to Eskom's capacity to service a substantially reduced national load; but rather to the municipal sector to distribute and deliver the power reliably. It is at the distribution level that we face some of our most significant challenges as a nation. To some extent, the distribution network serves as a fuse in the national grid. A cynic would argue that, were the distribution networks in all cases adequately maintained, then Eskom would not be able to supply the need.

Cynics would also point out that, in various municipal areas, accounts are vastly in arrears – and this implies much-needed cash-flow to maintain the system (including for paying users) is simply not there. The consequence is an increasingly unreliable distribution network. But we are not cynics and the issue is an important one.

Recently, there have been a number of instances ascribing electricity outages to illegal (i.e. unplanned) connections made to the distribution infrastructure in various municipal areas. The net effect is that the network becomes overloaded, and the protection does its job and trips – effectively protecting the system, but leaving legitimate users in darkness.

If this is true, then the issue is certainly serious and needs urgent intervention. The consequences of power outages are various – but frankly domestic inconvenience is the least worrisome of them all. Consider for a moment critical health facilities that may well not have adequate back-up supplies; flashing or 'off' traffic lights that clog up the roads for hours; or an organisation that cannot operate.

These consequences have a significant impact on the economy and on our society. Whereas it is easy to understand the need for a family to have warmth and the security of an electrical supply, the trouble with this being realised outside of any level of planning is catastrophic.

There can be an argument that electricity supply (even for heating) is actually essential in modern built-up areas. There are many places with palls of smoke on a winter's morning making driving (let alone breathing) difficult. Imagine living like that, and the cost of that on the health of our population?

So electricity is important – and everyone should have access to it. This draws into sharp focus the capacity for certain demands, realised outside of the formal process, to adversely affect the very economy that is striving to improve the lives of everyone in the nation. It is a wicked problem and it is evident

that without growth in the economy pretty much everyone becomes less well off. Whereas I suspect that those at the top of the pile would probably feel little influence – it is those (the most vulnerable) near the bottom of the pile that will be devastated.

For instance, the ability of the State to pay out social grants – necessary to assist those most affected by our past and our current situation – is fundamentally dependent on the ability of the country to raise the cash to do so. It is a concern that this contribution has continued to rise – both because of the strain it places on the central coffers, but equally because it must surely speak to either a failure of policy or practice as regards engaging more and more people in the economy.

To be blunt – illegal activity that may benefit a few but will jeopardise a far larger number – simply cannot be tolerated. My deepest dismay is to see how often society has been conditioned to turn a blind eye to this type of thing. Frankly, to wait for law-enforcers to detect nefarious activity and act on it is almost insignificant if society does not step up and assist. I wonder to what extent this is an issue that can be turned around in the future.

What it requires, of course, is direction and example-setting. Let it start with us. It is, after all, at our level that attempts are being made to build the economy.

We cannot allow that to be undermined.



Ian Jandrell

Pr Eng,
BSc (Eng) GDE PhD,
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Ian



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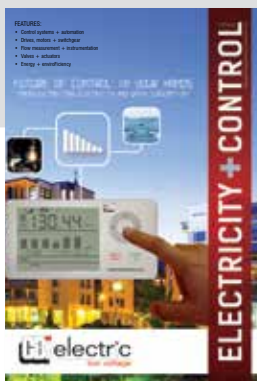
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The **NanoView** from **CBI-electric: low voltage** is an exciting new energy and water monitoring device suitable for household as well as commercial consumers. *Read more on page 13.*

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Impact of Energy Management on Process Automation Systems

Peter Hogg, Schneider Electric

The key functions of an energy-aware Process Automation System (PAS) and how its links between production and energy result in increased production and energy efficiency.

In 2012, 4% of large corporations surveyed by Accenture [1] said they deselected suppliers who failed to meet environmental objectives. Another 39% projected that they will soon follow this lead. This increasing focus on sustainable production is not only driven by regulation but also by the ability of sustainably focused companies to outperform their peers.

Strategies for energy efficient production need to take a holistic approach in order to achieve the universal targets of reducing carbon emissions by 20 – 30%. The approach needs to focus on more efficient equipment, process changes, and operator engagement to make and maintain significant energy savings. Many companies have started on this journey, often by simply adding some power metering and dashboards. Most of these systems, however, fail to link the consumption with specific production efforts and operational tasks. Consequently, their conversion to real energy savings is low.

The industrial sector is by far the world's largest consumer of energy [2], and for many industrial companies, energy is the single largest cost within their business. If we take the example of a wastewater treatment plant, energy represents 34% of operating costs, yet the focus has traditionally been on process efficiency and the use of chemicals, which only represent 16% of the total cost.

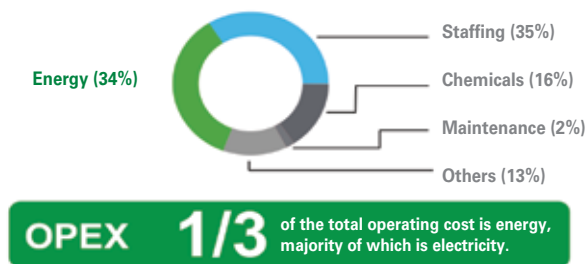


Figure 1: Energy, a significant cost reduction opportunity: Wastewater treatment.

The reason we were happy to focus on production efficiency was based on two widely held assumptions. The first was that an efficient

process uses the least amount of energy, and the second was that the cost of energy was so small that its consumption in any one location had minimal impact on the overall costs of operating a plant. The pressure of the world's expanding population and increasing standard of living [3] is driving up the demand for energy, with estimates expecting that energy usage will double by 2050 and electrical consumption by 2030 [4].

This increase in demand can only be supported by new power generation and infrastructure, resulting in higher prices. This increase in demand coincides with a growing awareness in the community of the detrimental impact of carbon emissions on the environment, as seen in recent studies which show that most consumers are actually prepared to pay higher prices for goods produced in a sustainable way [5]. These standards define the processes and the auditing which are required – but rarely explained – to realise energy savings.

How much do we need to reduce?

Energy consumption is on the rise and set to almost double between 1990 and 2035 [6]. The majority of this rise will come from outside OECD nations and is driven by long term economic growth.

Increasing standards of living require more manufactured goods, but the increased energy levels required to produce them are not sustainable. Figure 2 shows the anticipated increase in energy consumption (our reference scenario) but then also looks at the mediation methods which are required to deliver the energy reductions to restrict carbon emission growth. Energy demand in the New Policies Scenario still grows by 35% in the period between 2010 and 2035, but without implementing the assumed efficiency measures, the growth would be 43%.

It indicates (in lavender) that the largest energy savings must come from end user energy efficiencies. Industry is not only the largest consumer of energy, but also the area with some of the most cost effective energy savings capabilities, and it is expected to make the largest contribution to energy reduction. Figure 2 demonstrates the need to change the way energy is consumed in the manufacturing sector.

EMIS – Energy Management Information System
 IEC – International Electrotechnical Commission
 ODVA – Open Device Vendors Association
 OECD – Organisation of Economic Cooperation and Development
 PAS – Process Automation System

Abbreviations/Acronyms

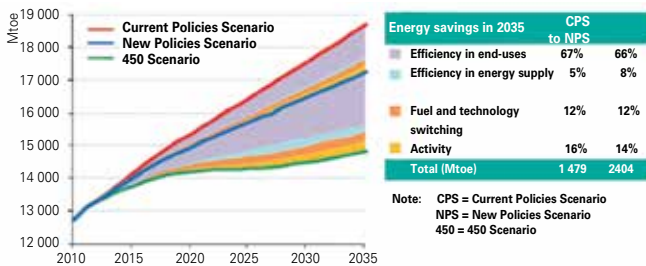


Figure 2: Change in global primary energy demand by measure and by scenario.

Managing energy

In order to help customers meet this challenge and generate large energy savings, it is necessary to take a more holistic approach to energy management. The following energy management life cycle model illustrates an effective guide. It shows five distinct areas of focus for improving energy management: strategy, supply, demand (our focus), analysis, and performance monitoring. The most common starting point for energy management is to measure performance. It is hard to develop a strategy without first understanding the current position, and most energy management processes will start with an audit or measurement.

This stage of 'Energy Awareness' often looks at benchmarking plants and production against target energy consumption levels. In Europe, this Energy Efficiency Audit, or Energy Management Information System, is required as part of the European Parliament's Energy Efficiency directive (published October 25, 2012).

The information from the performance phase is typically displayed on a dashboard. The data can be shown on large screens so it is visible across an enterprise. In industries where there are lots of repetitive systems or existing benchmarks, this information provides businesses with a clear picture of their performance. When measuring building efficiencies, there are clear benchmarks for energy consumption based on the building's floor area and the external temperature. Based on these values, energy consumption models can be used for generic buildings.

This approach can also be applied to the industrial sector where there are benchmarks for some processes, but where it is rare that we get a clear benchmark on energy consumption.

The issue with benchmarking for industrial companies is twofold. First is the complexity of the process. Take, for example, a simple process such as a water pumping station. Its energy consumption will change on a daily basis; it will also be impacted by the distance and height pumped, as well as local rainfall. All these factors increase the complexity of our model. The second is that while a benchmark offers a point of comparison, it does not provide guidance on what to change within the system.



Figure 3: The energy management life cycle.

Key to delivering energy savings in a manufacturing process is the ability to convert the information into an action or a change within the plant. To create actionable change in our plant, we must stop focusing on energy consumption against time and instead focus on what the energy is actually doing (i.e. the production). To get an accurate link between production and the energy consumed, we need to collect energy information in alignment with process data. The cleaner the relationship is between the action and the data collected, the more accurate we can be in our analysis and the better our results. A typical control system includes a large number of energy consuming elements. Each of these elements contains one or more of our energy sources (water, air, gas, electricity, and steam). Some pieces of process equipment may actually change energy source based on the customer's strategy for managing their energy supply.

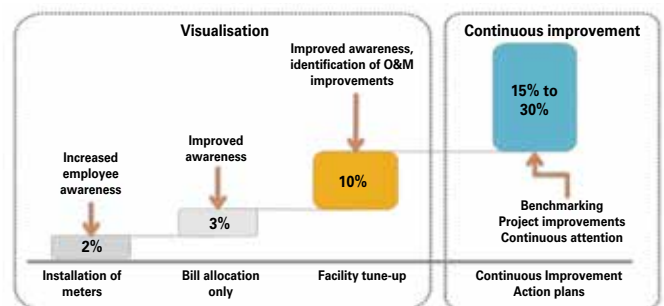


Figure 4: The potential energy savings difference between visualisation and continuous improvement.

- The global expanding population is driving the demand for energy.
- Energy usage will double by 2050 and electrical consumption by 2030.
- This increase in demand can only be supported by new power generation and infrastructure... resulting in higher prices.



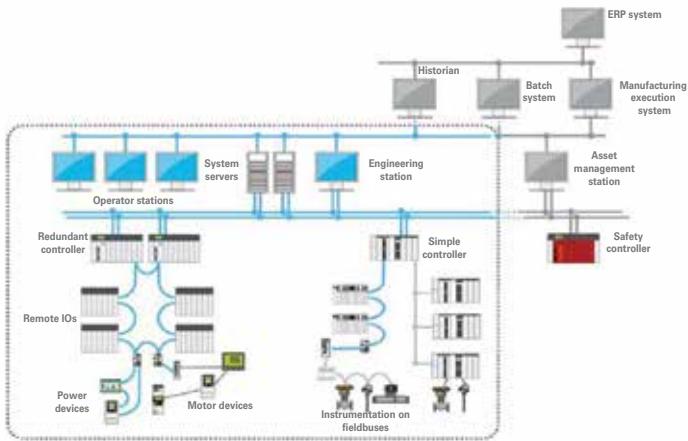


Figure 5: A typical PAS architecture.

The first step to using energy management to enhance the performance of your process automation system is to collect data from the energy data sources and energy consuming devices across the control system. If power metering exists, it is often already connected to alternative systems which communicate data via power system protocols such as IEC 61850 [7]. The PAS needs the capacity to communicate with these power meters in parallel to their existing systems, or to communicate with the energy systems, themselves, to collect the energy data. Energy data is also available (at lower resolutions) within many types of energy consuming process equipment. In some cases, it must be calculated or approximated through the use of process values which are known to correlate to the energy usage (virtual metering). In the past, the process of collecting data from a production system has been difficult due to multiple vendors and standards. The Open Device Vendors Association (ODVA) has created standards for the measurement and transfer of energy data within control systems. Support for standards like these enables energy management to be rapidly implemented on sites with systems from a variety of automation vendors.

While the display of energy and production data over a period of time on the same graph helps to identify energy waste, it nonetheless hides the complexity of the process which creates the demand. To relate energy to production, we must be able to allocate a specific energy consumption level to a specific process within the system (possibly aggregating data from multiple energy sources) and also divide the energy consumption into intervals of common production (process segments) so that targets can be set and comparisons made. To aggregate the energy data within a single process, we often need to combine electrical and non-electrical data for a large number of sources across a network. This link is available in an energy-aware PAS. It links the energy consumption and the process, ensuring that changes in the process are reflected within the energy management system.

While the aggregation of components is required in some systems, it is also necessary to measure the energy consumed in 'unmetered' systems. This concept of a 'virtual meter' – to create a meter for data which is unmeasured – can either measure 'what is left' from a parent meter or the theoretical energy consumption of simpler devices. The implementation of the exact aggregation/virtual meter topology will need to be customised based on the available energy data. Connecting our process energy to process actions requires a measurable unit of production. Sometimes, this will simply be a time period of production; sometimes, it will be the production of a certain number of units of output, and sometimes it will be a cycle. The choice of measurement is impacted by the process, but the automation system should be able to work with any of these

intervals and capture production information and energy data for further analysis. Energy-aware automation systems provide objects to easily collect the data recorded by these intervals and pass this information on for analysis.

Analysing energy

The analysis of energy consumption and production data can be done at many levels within the control system. At the lower levels, the operations team is able to use the energy data to detect processes which are not operating at their rated efficiency and, in so doing, detect restrictions in the process capability which were previously going undetected. At higher levels, energy managers can compare the plant's overall energy efficiency in order to create energy management programs and drive down the manufacturing costs. Key to analysing the root cause of energy consumption is, naturally, to investigate the process which is consuming the energy. The energy-aware PAS will bring together these production and energy consumption data sets. Doing this at lower levels within the process generates a large set of production and energy data for an operator to monitor. Rather than adding additional displays for the operator to review, it is better where possible to analyse the energy consumption with the controllers, and either take direct action or flag only abnormal energy consumption to the operator via the alarm system.

The data in the example below shows the strong relationship between production (tons) and the energy (Kwh) used to convey ore through the system. It also reveals that there are numerous periods in which no production has occurred but energy was still being consumed. The control system's ability to detect this unnecessary or wasted energy also allows it to take action to remove the waste (almost 7%). The control logic used in this system is similar to that used in many control systems, but because it was not energy aware, frequent starting and stopping resulted in energy wastage. In this case, an energy aware control system could detect the absence of feed on the belts and more rapidly start or stop the sequence (using power consumption as a process sensor).

While many processes are continuous (resulting in a strong relationship between production and energy consumption within a time interval), other process are batch oriented. Batch oriented process are often analysed only at the completion of each batch, with the batch size and amount of energy consumed following the same relationship as in a continuous system. Some longer batch processes can also be analysed within the batch.

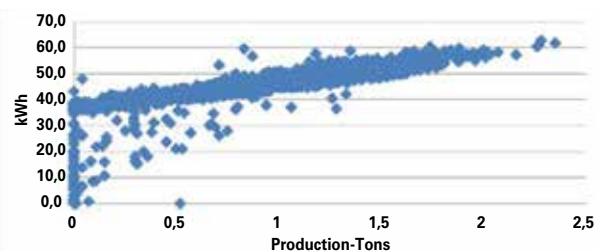


Figure 6: Production and energy data for operating periods of a conveying system.



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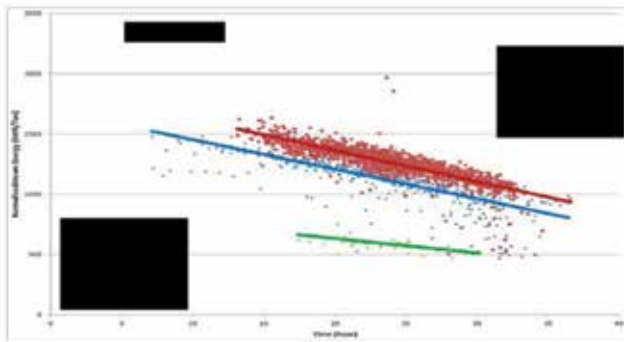


Figure 7: Production and energy-generated data from a slow process.



Figure 8: Typical EMIS system.

The data in Figure 7 shows the relationship between energy production (as waste heat) and the operation time of a longer process. As expected, the longer the process continues, the less energy is generated. The significant periods are highlighted in different colours. The operation of a waste heat recovery system is much more complex than a simple conveyor.

The energy-aware control system has detected the lower performance of the system but is not able to attribute this to a specific cause so it alerts the operator. System alarms can be caused by manual operations, changes in setpoints or other factors which are not specifically monitored so some analysis is still required. Triggering alarms as close to real time as possible allows the operator to minimise the likely cause of the underperformance. The PAS is able to detect real-time variations in energy consumption from defined targets. This enables real-time action to be taken to adjust the energy overconsumption but it does not provide management with the data they need for a higher level of analysis. To access that data, industrial sites need an Energy Management Information System (EMIS). The EMIS spans both the supply and demand side analyses. For supply side analysis, the EMIS must link to tariff schedules and analyse energy consumption against the tariffs available. For the demand side, the EMIS must link the same energy data in the context of the production. The EMIS allows users to see longer term trends for each system against industry benchmarks and other systems on the site. For industrial customers, an EMIS must work with the data from an integrated power and process system.

From opportunity to action

Energy analysis based on data from an energy-aware PAS will provide real insight into the energy consumption of each process, and will identify the major changes which are possible in order to reduce the energy consumption of a control system. To achieve this reduction

in energy consumption, we need to turn to the control system, its equipment, processes, and operation.

Integrate efficient devices

More efficient devices are constantly being developed for the market. Sometimes, the efficiency is based on a more effective process, but sometimes it is about trying to save energy during non-operational times. Efficiency during operation is inherent in the device and its configuration. Integration of these devices and set-ups in the configuration of the PAS helps to better configure and maintain this efficiency. While efficiency in production is important, there is an increasing focus on reducing the energy used during non-operational periods as this is waste (not used for production). For non-operational energy savings, companies should look for open standards. ODVA provides standards to enable a PAS to engage its energy saving modes. While energy saving modes are part of the ODVA standards, to be very effective in their implementation, they need to be integrated back into the PAS libraries so that energy can be saved both when the plant is stopped and during partial process downtimes.

Implement and monitor optimised processes

More efficient processes are developed based on years of process experience. Traditionally, vendors produce PAS libraries with a focus on achieving their process goals. An energy-aware PAS will have libraries designed to achieve optimum energy efficiency. The libraries are also typically pre-designed to support energy and production data collection to ensure easy benchmarking and comparison. The great advantage of having energy information available within the PAS is its ability to constantly track its energy consumption relative to the targets identified for analysis. The effort required to execute a process (represented by the energy consumption level) is a valuable indicator of the progressive reduction in the process' efficiency. The energy-aware process control system can constantly track deviations between consumed energy and the target, and provide early indications of equipment wear or an obstruction in the process. While we can try to save energy in many locations, the largest energy wastage occurs during downtime. The failure of one component or system within the plant makes production by the rest of the system impossible, yet the energy consumption continues at production levels. By reducing downtime, the energy-aware PAS not only saves energy from being unnecessarily consumed, but also uses energy information to keep the process optimised and effective.



Energy aware control systems are speeding up production while reducing the operational cost of the control system.

More effective people

Frequently, many of the opportunities to improve processes lie in improving the knowledge and behaviour of the people operating the system. In the short term, these behaviours and knowledge can be enhanced with training, but as employees turn over, the most effective way to ensure energy efficient production is to build

these effective behaviours back into the process control system. As identified, the energy-aware PAS focuses on reducing or removing downtime by using energy as an indicator of the system's health. It also helps operators to rapidly resolve downtime issues by bringing meaningful information and tools from across the control system during runtime. This next generation of process automation systems allows operators to use navigation runtime services to access a full array of information (previously spread across different systems) at whatever point they need it. The energy-aware PAS also improves operator effectiveness when the plant is operating. Because energy waste can also be caused by operator actions, the benchmark errors for energy consumption provide a way to ensure operators get rapid feedback on the way they run the process, reinforcing the training messages and expectations. It is also a useful asset for the transfer of knowledge from senior engineers to more junior colleagues upon retirement. As well as capturing post energy event information, an energy-aware PAS can also be used to alert operators before excess energy costs occur, thus better connecting operator actions with the energy peak and, more importantly, endeavouring (whenever possible) to avoid energy peaks within the plant.

Conclusion

In the age-old dilemma of how to increase production and decrease downtime, controllers have been refined and improved to ensure maximum efficiency. In fact, there now seems to be little room for improvement in this sphere. The way forward to greater production efficiency and less downtime appears to lie in the ability of a PAS to collect and aggregate energy data to match a process, and for this data to ultimately enable the system to communicate when a piece of equipment is not performing to its usual standard. This approach not only delivers the benefit of optimal energy usage and, therefore, energy cost, but also the ability to diagnose, predict, and plan for equipment failure and malfunction – a solution that is surely a plant manager's dream come true.

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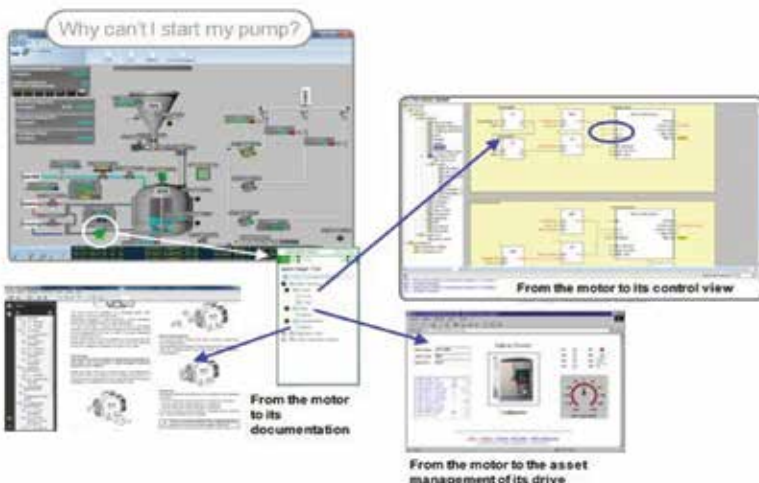


Figure 9: Context sensitive runtime services allow the user to rapidly navigate to multiple systems to resolve a fault.

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At the Hannover Messe, Turck, represented locally by **RET Automation Controls**, showcased the TBEN-L-DCC – an intelligent RFID module with integrated data processing functions. The Device Control Centre is optimally equipped for use in different Industry 4.0 scenarios in production and logistics, such as in incoming goods and dispatch areas, in the localisation of containers, order picking, or the control of goods flow.

The Device Control Centre is based on Turck's robust TBEN-L RFID module platform with protection to IP67, and offers an additional eight freely definable inputs/outputs as well as connection possibilities for four RFID read/write heads in HF or UHF technology.

Communication with higher-level ERP or MES systems is implemented via Ethernet TCP/IP. The module is equipped with Device Control Service (DCS) for managing and controlling the connected hardware and the pre-processing of sensor and RFID raw data.

The software enables the filtering and preselection of the RFID data. Standard interfaces such as Web Services or CSV file storage allow the direct routing of the processed data to other systems. The smooth running of the module is ensured with an ARM Cortex A8

controller with Windows Embedded Compact 2013 and an 800 MHz frequency, 4 GByte NAND Flash memory and 512 MByte DDR3-RAM. The TBEN-L-DCC with Windows Embedded 2013 should be in stock from the third Quarter of 2016. Additional versions with alternative system software will follow.

Enquiries: Brandon Topham.
Email brandon.topham@retautomation.com



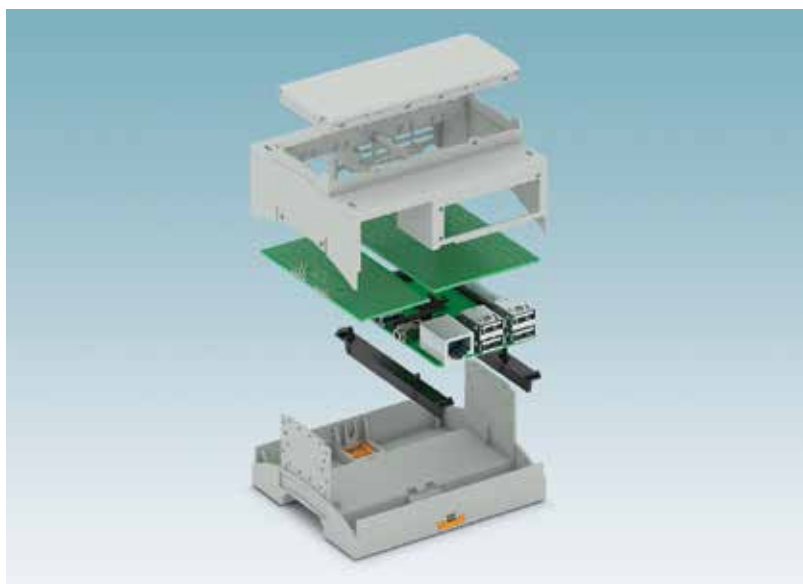
Housing solution for Raspberry Pi minicomputers

With the RPI-BC electronics housing, **Phoenix Contact** offers the first housing solution to accommodate Raspberry Pi minicomputers. The housing, which features tool-free mounting, is suitable for Raspberry Pi versions B+, B2, and B3. An optional adapter also enables the use of the Raspberry Pi A+.

The housing provides additional installation space for individual PCBs, perfboards or components which can be used to extend the scope of functions of the minicomputer. The housings with an overall width of 107,6 mm (dimensions according to DIN 43880) can be mounted on a DIN rail or directly on the wall. Using a DIN rail bus, several modules can also be connected together or combined with development kits for the BC housing series. PTSM PCB connectors are available as an option for connecting the GPIO (general purpose input/output) interface.

The combination of protective housing and compatible connection technology offers small-scale manufacturers, research organisations, and hobby developers an efficient complete solution for extending the Raspberry Pi computer to create an electronic module that suits the application.

Enquiries: Sean Hadley. Email Seanh@phoenixcontact.co.za



Evaluates temperatures from 100°C - 600°C

The TR evaluation unit is a universal control and display unit for connection of PT100 / PT1000 sensors (TT, TM and TS series). The evaluation unit automatically detects whether two-wire, three-wire or four-wire Pt100 or Pt1000 sensors are connected. The sensor includes quick and easy handling via three pushbuttons with a VDMA menu.

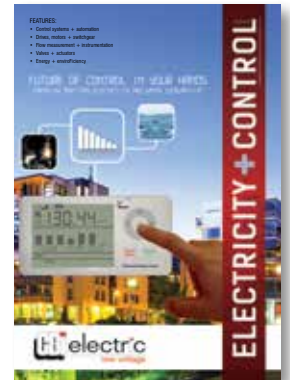
The display can be switched from the indication of 'red' to an alternating indication of 'red - green'. The switching states can therefore be highlighted or an independent colour window can be created.

Thanks to the extended measuring range of 100...600°C, an enormous number of common temperature measurement and monitoring tasks in the manufacturing and process industries can be solved.

Enquiries: Alwyn Skelton. Tel. +27 (0)12 450 0400 or email info.za@ifm.com



CBI-electric's New NanoView Monitors energy and water consumption



The NanoView from CBI-electric: low voltage is an exciting new energy and water monitoring device suitable for household as well as commercial consumers. With the rise in electricity costs, the current drought and the drive to greener living we all need to adjust both our energy and water consumption habits.

Recently receiving much acclaim at the African UtilityWeek, the newly launched CBI-electric NanoView allows individuals to easily manage their electricity and water usage. By displaying live data in both monetary and consumption terms (i.e. energy in W and kW; and Water in litres and kilolitres) the user can quickly determine which appliances not only use more energy, but also which appliance cost the most to operate. With this data on hand the customer can now make energy wise decisions. The cumulative usage mode on the Monitor displays consumption for the past day, week or month and is a great tool to manage budgets and evaluate progress in achieving a greener lifestyle. The NanoView is the ideal tool to educate the whole family in greener habits and manage their water and energy consumption more closely.

The NanoView allows for real time and accumulated historic consumption data of up to 16 circuits and 4 water meters. It has user selectable names to identify circuits such as plugs, lights, geyser, stove, outbuilding (flatlet, lapa), pump (pool, borehole, A/C), water and then provides for total consumption.

It has an iPod[®] inspired modern touch button interface and a real time high consumption warning LED. The high consumption warning is customer-set, based on customer energy saving goals.

The South African mains voltage is nominally 230 V AC. Although

most electrical appliances can tolerate some fluctuation of this value, extreme voltage variations will cause permanent damage. An over-voltage causes most appliances to overheat. Motors and transformers are likely to short-circuit and electronic equipment, like computers and TVs, blow fuses or worse. During an under-voltage scenario lights and elements will dim and other appliances will simply not power up. However, it is common for motors, like compressors in fridges and airconditioners, to struggle or stall completely, draw large currents and burn out. Similarly, some electronically controlled appliances, such as computers, TV equipment adaptors, CFL / LED lights and other electronic ballasts, are designed to output a constant power. When the voltage is low, these appliances compensate with increased output current, resulting in overheating. Even if the failure is not immediate, the lifespan is significantly shortened. For these voltage fluctuation instances the NanoView also provides over- and under-voltage warning, to inform the customer when appliances should be switched off and when it is safe to switch appliances back on after the fluctuation in voltage has ceased.

For energy monitoring the unit can be connected to up to 16 power circuits with a sensor measuring range of 5 W - 14 kW (60A max). The Monitor has a power sensor accuracy of 99% (Class 1) and an operating Voltage of 230 V AC \pm 20% at 50 Hz, with a 1 second refresh rate and a 24-hour battery backup for time keeping. An added benefit is that consumption data is saved indefinitely during power failures.

The water meter provides for up to 4 water meter transmitters with a range up to 100m. The water meter has a 3-year battery life (displayed). It has a 1 litre accuracy and is compatible with a number of popular water meter brands including the Elster Kent V110 and the Precision Meters ASM as well as most reed switch capable brass and plastic water meters.

There are consumption graphs for each circuit and water meter every hour for the last 24 hours; day for the past 2 weeks; week for the past 7 weeks; month for the past 12 months; and calendar year for up to 5 years.



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Website: www.cbi-lowvoltage.co.za

All-in-one measurement station

Depending on the application, sensors can be used for object measurement as well as for objection detection. The Leuze LSC 200 is a complete system, or all-in-one measurement station, and is suited to applications in intralogistics and packaging operations where sensors and evaluation units are optimally matched to one another. Pre-installed software on the evaluation unit performs data



acquisition as well as pre-processing and, depending on the task, the extraction of user data. The user data is made available via defined interfaces, such as Profibus, TCP/IP.

This type of measurement station is much more than simply a complete system. Due to its flexible adaptability, it can serve as a solution platform for certain tasks, whereby, again task dependent, sensors with a wide range of performance capabilities are connected and evaluated.

Essentially this means that the Leuze LSC 200 can also be expanded with sensors that perform identification tasks, such as bar code readers. Dimensions can be measured with, for example, three light curtains (length, width, height) using the optical throughbeam method. And if necessary, the width and height measurement can also be measured using scanning light section sensors or laser scanners. The length measurement can be optionally performed using an incremental transmitter.

Depending on the sensors used and the properties of the objects that are to be measured, various filters can also be set in the evaluation software for optimising the measurement values.

Enquiries: Gerry Bryant.

Tel. +27 (0)11 615 7556 or email bryant@countapulse.co.za

Device configuration at your fingertips

Comtest, local representative of Fluke Corporation, is proud to introduce its Fluke 154 HART Calibration Assistant, a standalone tablet-based communication tool that makes HART configuration easy. The 154 provides HART communication functionality that when combined with a Fluke 750 Series Documenting Process Calibrator or 720 Series Multifunction Process Calibrator enables the user to calibrate the full range of HART devices used in the process industry. The Android-based tablet comes configured with the FlukeHART mobile app that utilises a long-range wireless HART modem, which connects to the HART transmitter being tested or configured. This allows technicians to wirelessly communicate with the device up to 250 feet away eliminating the need for technicians to stand next to the device so they can work from a safer, more convenient location. The 154 provides full HART Device Description (DD) support of all HART devices and can monitor PV, SV, TV, QV, and other measured HART variables. Quarterly DD updates can be downloaded free of charge from the Fluke website for three years from the first use of the product. The calibration assistant includes a configurable connection cable that accepts either hook clips for connecting to wires or extended tooth alligator clips designed to connect to transmitter connection screw heads. Its rechargeable lithium-ion battery is designed to last for several days of device testing and configuration under normal conditions.

Enquiries: Tel. +27 (0)10 595 1821 or email sales@comtest.co.za



Controller improves high speed accuracy and performance

Manufacturers are under constant pressure to increase production speed and throughput while still maintaining quality. They also are making increasing demands for smart machines. The new Allen-Bradley CompactLogix 5380 controller from **Rockwell Automation** can help meet these demands by providing more precision, connectivity and up to 20% more application capacity than previous CompactLogix versions.

Ideal for high-speed applications with up to 20 axes of motion, the CompactLogix 5380 controller brings the benefits of the high-performance Rockwell Automation Integrated Architecture portfolio into the CompactLogix size. When combined with the new Allen-Bradley Bulletin 5069 Compact I/O system, scheduled outputs improve I/O response time to as fast as 0,2 ms. Event triggers from the I/O modules provide near-instantaneous task execution.

"This new controller is particularly helpful for high-speed packaging applications where fast response times are critical for keeping production running smoothly," said Christo Buys, Business Manager for Control Systems, Rockwell Automation, sub-Saharan Africa. "Features like scheduled outputs and event triggers, which are new to the CompactLogix family, allow engineers to design compact machines that achieve higher accuracy and precision."

In addition, a dual-configurable, 1-gigabit Ethernet port supports Device-Level-Ring (DLR) topologies or the use of multiple IP addresses. The ability to create multiple IP addresses is especially useful for manufacturers seeking to establish network separation between plant-floor and enterprise-level traffic.

Enquiries: Christo Buys. Tel. +27 (0)11 654 9700 or email cbuys@ra.rockwell.com

Engineered for high tolerances

Engineered with a high tolerance to different materials, the Leuze 10 Series optical sensors are able to detect objects and measure distances with an incredible accuracy of ± 30 mm. These high performance sensors have an operating range of up to eight metres.

The high tolerance of the Leuze 10 Series sensors further extends to the angle of incidence, the colour, surface structure and brightness of reflective material. This means that the sensor is capable of detecting different materials, such as wood or matt as well as glossy metal, and this is possible even under varying environmental conditions.

The Leuze 10 Series is also suitable for sensing applications where deep black materials are found or where objects are not ideally aligned or moving rapidly.

Ease of use is facilitated through the highly visible status indicators on the devices as well as the large control buttons. The LED display has been designed to facilitate step-by-step commissioning and diagnosis at the press of a button.

The compact housing, with integrated recesses for M4 screws or nuts, means installation is possible in application where space restrictions exist. However, its small size does not impact on the overall performance of the Leuze 10 Series.

A comprehensive range of Leuze sensing solutions is available from official distributor, **Countapulse Controls**. The company, which is based in Johannesburg, is able to assess any sensing application and provide a fit-for-purpose solution that will meet the specific needs of an operation. The company also offers a 24/7 hotline to assist end users with technical challenges that may be experienced due to lack of knowledge or experience.

Enquiries: Gerry Bryant. Tel. +27 011 615 7556 or email bryant@countapulse.co.za



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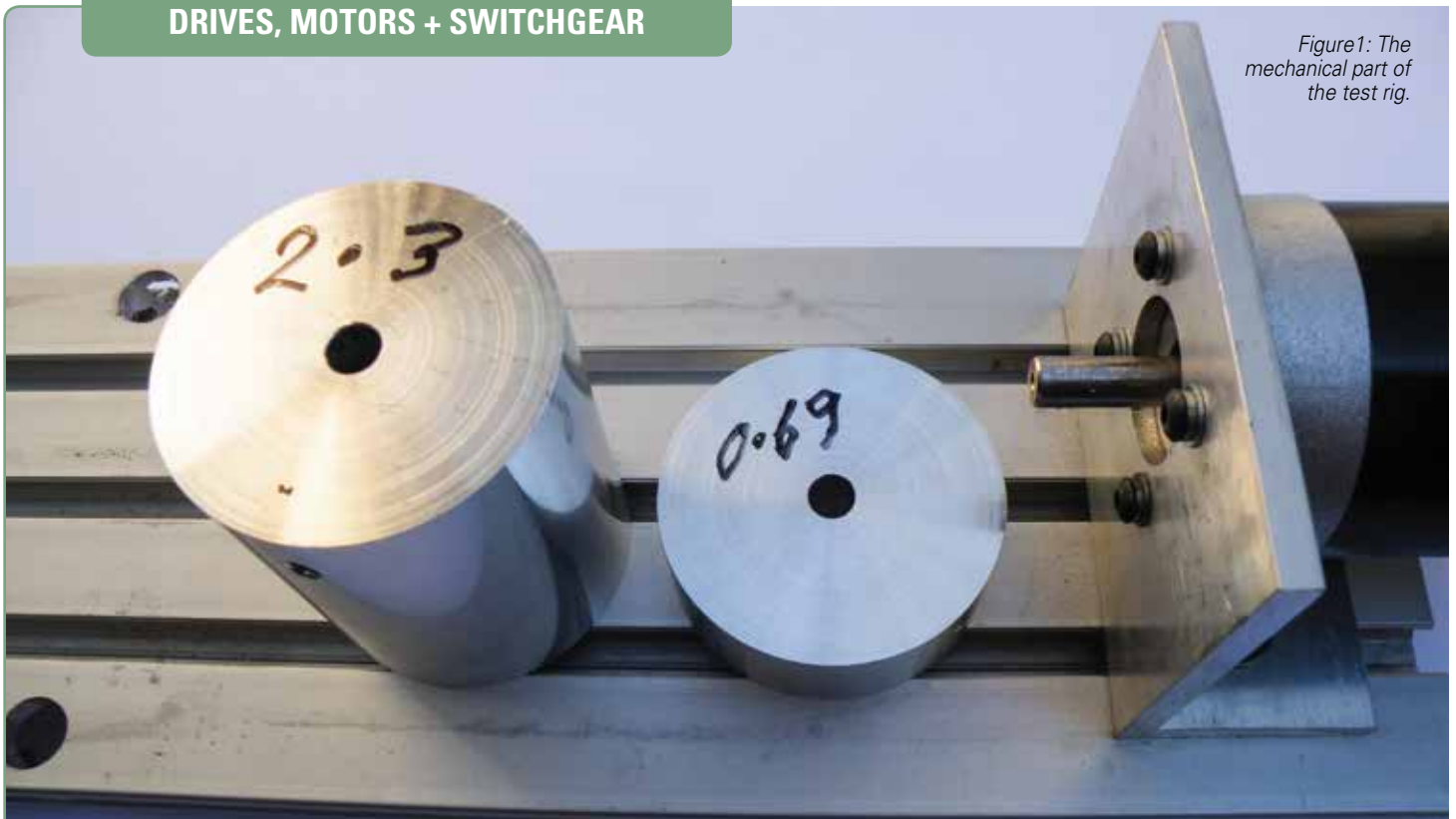


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Matching load and servo motor sizes

Glyn Craig, Techlyn

This article, the fourth in the series, deals with stability in practical systems.

The effect of different load inertias is illustrated with experiments using real life components. In addition, tuning the controller is covered in detail. Previous articles described system testing, servo operating principles and a practical mechatronics case study. This article describes the effect on the system when the load inertia is changed.

Equipment used

For the test, a brushless motor was mounted on a chassis and coupled to a Techlyn brushless drive. Test response was measured using a Personal Computer (PC) coupled via a serial port to the drive. Step response was displayed while the tuning parameters were interactively changed. Tests were carried out on the motor with no load, as well as with flywheels dimensioned to provide load inertia of 3 X and 10 X motor rotor inertia. Conventional wisdom states that inertia matches of up to 10:1 are acceptable, with the optimum point being at 3:1. Our experiments sought to see if this was indeed true. Our drive is controlled by a Microchip PIC18F2331 microcontroller. This device is highly optimised for motion control with all time intensive functions being performed by hardware registers. Moves are commanded via a serial port or step and direction digital inputs. The step and direction inputs make the system resemble a step motor system (with encoder position maintenance). The PC test program sends move commands and graphs the response with respect to time.

Tests

The test motor had a rated rotor inertia of 0,23 kg.cm². Two flywheels were machined with inertias of 0,69 kg.cm² (3:1 inertia match) and

2,3 kg.cm² (10:1 inertia match). In total, six tests were performed and graphed.

What do the parameters on the graph mean?

Ideally, the July 2015 Electricity+Control article (Brushless servo operating principles) should be to hand [2].

Figure 2

- On the lower left is the Servo Parameters Pane
- Kp is the Position Gain
- Kd is the Derivative Gain
- Ki is the Integral Gain
- Ii is the Integration limit
- The top half shows the rotor position with respect to time
- At the lower right is the Configuration Pane which is self explanatory. The horizontal dotted lines are the position thresholds which are used to measure times. The rise time for instance is the time measured from zero time to the first crossing of the lower threshold

PID Servo Control

These are the control filter parameters. The output to the motor amplifier is the sum of three components:

- One, proportional to the position error providing most of the error correction (Kp)
- One, proportional to the rate of change in the position error which provides a stabilising damping effect

- II – Integrator limit
- Kd – Derivative gain
- Kp – Proportional gain
- PID – Proportional Integral Derivative

Abbreviations/Acronyms

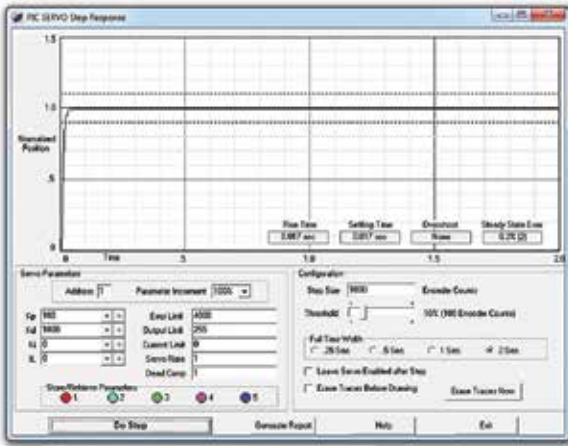


Figure 2: Rotor only using the program default settings.

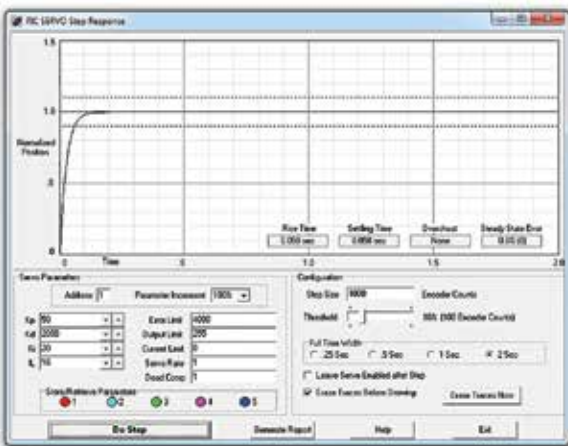


Figure 3: Rotor only but tuned for optimum response.

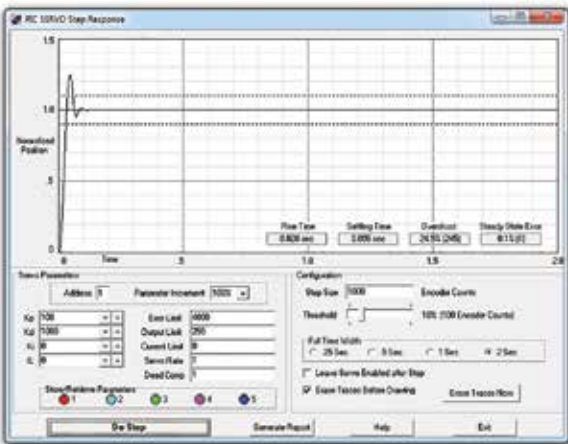


Figure 4: 3:1 inertia match – default settings.

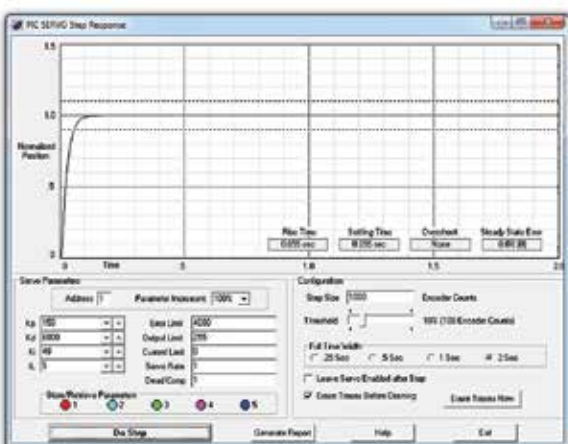


Figure 5: 3:1 inertia match – optimum settings.

- One, proportional to the accumulated position error which helps to cancel out any long-term error, or ‘steady state’ error
- Approximately 2 000 times per second, a servo tick occurs, and the filter, operating on the commanded position and the actual position for each servo tick, produces an output calculated as follows:

$$\text{Output} = K_p \times \text{pos_error} - K_d \times (\text{pos_error} - \text{prev_pos_error}) + K_i \times \text{integral_error}$$

The term pos_error is simply the current command position minus the actual position. Note the negative sign for Kd. The integrator limit (IL) sets a limit to how much the integral error can grow over time. Without this limit a huge integral_error could accumulate, resulting in a large setpoint overshoot when the set position was reached. Uncontrolled integral_error is known colloquially as ‘integrator wind-up’ and is a major source of system instability.

Note that the Kd magnitude is proportional to the difference between successive pos_error values. Fast changes result in the output being reduced by the subtracted Kd term. The result is a stabilising effect on system stability.

“
The PID filter compares commanded and actual positions.”

Analysis of the response graphs

Figure 2

- This test uses the default PID settings. The Step Size is set to 1 000 encoder counts or half a revolution of the motor shaft, and the graph length is set to two seconds
- The Rise Time is 0,017 seconds
- The overshoot is zero
- The Steady State Error is 0,2%. This is the result of the integral term Ki being zero. Note that any system friction would increase the Steady State Error

Figure 3

- The PID settings have been adjusted to produce no overshoot and zero steady state error. The Rise Time is now much longer as the result of the larger derivative (Kd) setting

Figure 4

- The combination of the default PID settings and the presence of coupled load inertia results in the overshoot seen. The settling time now exceeds the rise time

Figure 5

- With the same load inertia, the servo parameters have been adjusted to produce no overshoot and zero steady state error
- Note the large value for Kd

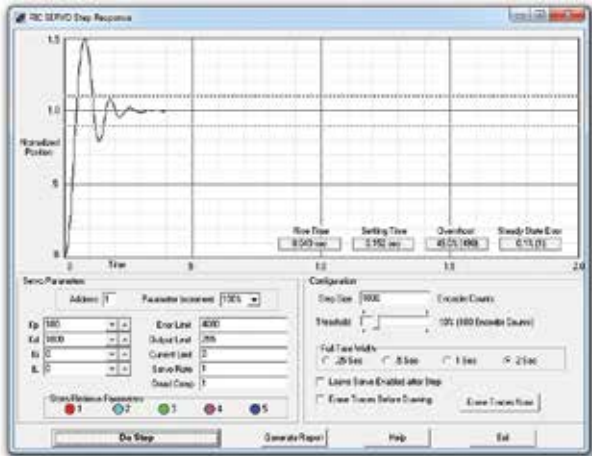


Figure 6: 10:1 inertia match – default setting.

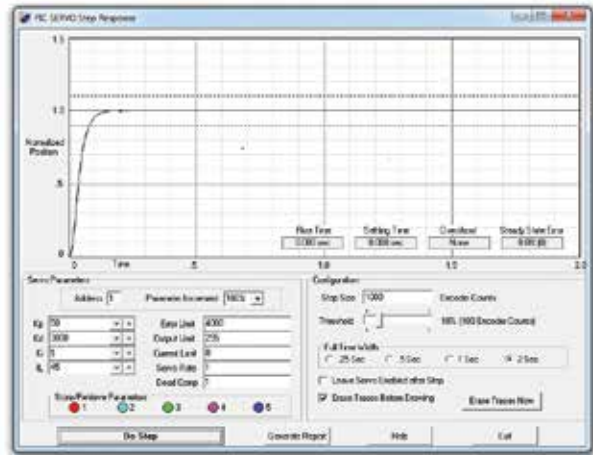


Figure 7: 10:1 inertia match – optimum settings.

Figure 6

- This time the inertia of the load exceeds the rotor inertia by 10:1. The default servo parameters result in the large overshoot and long settling time. The small Steady State Error is the result of no friction present

Figure 7

- Well behaved response in spite of the 10:1 inertia mismatch

Conclusion

It appears that the conventional wisdom on matching is valid in this case with good response easily achieved. Note that the presence of load friction would make system tuning more difficult. That said, most systems tend to be dominated by inertia. The Servo Parameters shown are by no means the only combinations possible for stable system response. For point to point control, such as a drilling machine, the rise time could be shortened at the expense of overshoot. As long

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as the steady state error was zero by the time that the drill entered the workpiece this would be of no consequence. System tuning is an acquired skill. In the case of servo systems the rapid response makes tuning much easier than would be the case with process control, where response times can be of the order of hours.

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- [1] Craig G. A bench top dynamometer for drives testing. Electricity and Control, May 2015.
- [2] Craig G. Brushless servo operating principles. Electricity and Control, July 2015.
- [3] Craig G. Computer Control of a small lathe. Electricity and Control, March 2016.

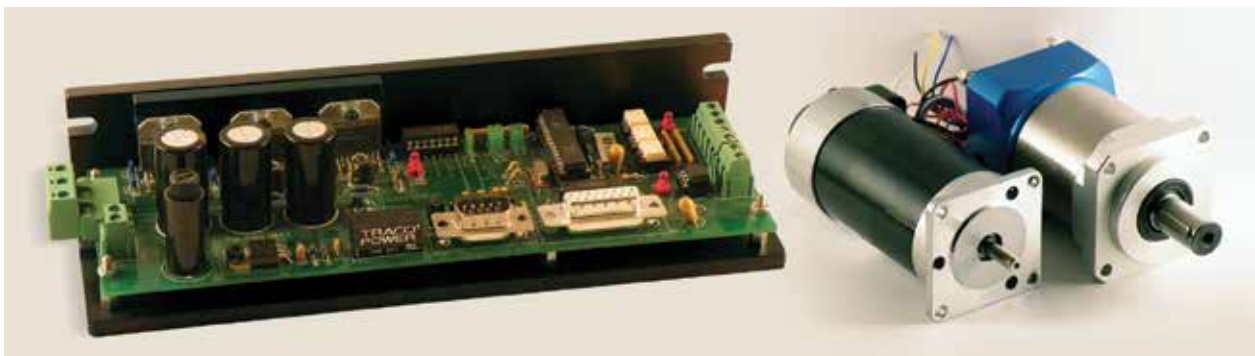
All articles referred to are available in the flip magazines online as well as in E+C Spot On.

- Sizing load and motor correctly makes proper performance possible.
- Inertia mismatch should not exceed 10:1.
- System tuning requires practice.



Glyn Craig is a director of Techlyn. He has been involved in the mechatronics field for many years. Enquiries: Tel 011 835 1174 or email glyn@techlyn.co.za

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 2013

Energising energy planning

David Claassen, Zest WEG Group

While policymakers continue to grapple with the dire shortage of electrical energy in sub-Saharan Africa, the private sector has an important role to play in shouldering some of this burden. Large centralised base-load energy projects have long planning and execution cycles and require large capital investments.

In addition, they are all accompanied by extensive transmission infrastructure requirements to connect the source of power to the consumer. At times, this can overshadow the cost of the power station, alone.

For this reason, there is a strong motivation for more decentralised energy generation models that see the decoupling of buildings and industries from national grid networks, bringing the source of energy closer to the consumer. These projects can

be delivered quickly, are more cost effective and easier to manage in their execution stages.

While there are a number of examples of the implementation of these projects on the continent, there is still much to be done to see more of them. There is a need to refine existing energy policies and frameworks that pave the way for the introduction of more Independent Power Producers (IPPs) to the African energy landscape and, just as importantly, allow them to export excess power that they generate to the national grids.

The European Union has made significant progress in the field and is a sound example of exactly what can be achieved on the continent by accepting so-called 'disruptive' trends in conventional energy planning.

Interest shown in smart grid infrastructure reveals a growing realisation on the continent that base-load projects need to be complemented by more mini grids and embedded generation solutions to meet Africa's electrification targets.

There are some interesting trends that show proactive steps are being taken in this

direction, and that energy consumers are in a position to play an important role as future generators of energy, over-and-above relinquishing their reliance on centralised power stations.

In South Africa, for example, participants in the property sector, including large Real Estate Investment Trusts, are taking a longer term view of the energy landscape in the country, and are well aware of the fact that the rolling blackouts in the country will return once economic conditions recover. Many of these companies have or are in the process of implementing vast roof top solar photovoltaic (PV) projects.

One of the limitations of these projects is the high costs associated with their sophisticated storage systems that keep them operating when ultra violet radiation levels are inadequate. With as much as 60% of these systems exposed to volatile exchange rates, the high risks associated with implementing more solar PV solutions can be a major inhibitor to the introduction of more solar roof top projects in the country.

This is exactly why ZestWEG Group engineers have been approached to design cost effective hybrid systems that rely on the free fuel available from solar, but replace costly



storage systems with diesel generators. An abundance of diesel fuel in the region makes the diesel generator one of the most reliable forms of back-up supply in the region.

The quality of the fuel has also been steadily improving, allowing for the introduction of generators that incorporate the latest clean engine technologies from European-based original equipment manufacturers.

The company is keeping a close eye on the role that gas plays on the East Coast of Africa, considering that gas is not only cost effective, but also a cleaner burning fuel, in line with the sustainability objectives of both the public and private sectors.

Zest WEG Group is already a prominent player in the region, having designed and installed generation solutions for the Tanzanian mining industry. This includes a 60 MW diesel generator solution for a flagship gold mining project in the region.

More recently, it designed and is in the execution phase of a 14 MW diesel power station in Mozambique on behalf of a large graphite mining company. The company has also been tasked with the control and distribution of the 100 000 litres of diesel the power station will consume a day. Mozambique continues to show significant potential as an emerging gas hotspot on the continent, complementing its significant coal finds, and strategically positioning itself as a future energy hub in the larger Southern African Power Pool. Zest WEG Group is involved in a large gas related IPP

project in West Africa that relies on gas as a fuel source, complementing a host of other power-related projects it has undertaken in the mining region of the continent.

South Africa also shows promise as an emerging gas player, but it will take a long time for the country to harness these resources considering the significant investment required to develop the infrastructure.

However, the 'lower hanging fruits', such as the abundance of methane gas produced at landfill sites and waste water treatment works in the country, are sufficient to generate much needed electricity.

Zest WEG Group has sound experience harnessing this resource having already undertaken such a project on behalf of Johannesburg Water at its Northern Treatment Works. These co-generation and embedded generation initiatives point towards a very different energy landscape on the continent in the future.

Eventually, we may not just see an interconnected Africa that is powered by large regional power plants. It is inevitable that the continent will have a flexible grid system that also relies on small and smart power producers that generate energy for their own needs, while strengthening supply with their excess production.

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Email marketing@zestweg.com*

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Andrew Cooper, Global Director, Mining, Danfoss Drives

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Two strong Nordic drive companies are now celebrating more than a year of their successful merger to form Danfoss Drives, with clear benefits to customers. For decades, both Danfoss and Vacon have supplied robust, reliable ac drives to the mining industry. Their merger represents a meeting of giants, taking the best of both, leading the way in engineering efficiency and sustainability in motor control for mining and mineral processing.

Danfoss Drives offers savings in both capital and operating expenditure via:

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The service and support organisation delivers an extremely comprehensive portfolio of DrivePro service offerings and MyDrive apps and software tools. These services range from design (project planning and application support) to hotline support for startup, repair and troubleshooting, to the sale of spare parts, customer training, periodic upgrades and scheduled maintenance.

For complex applications, Danfoss Drives also provides additional support in non-standard software development and in the analysis of problems related to specific application domains.

Typical motor technologies

All drives' needs are available under one roof, with the full range of VLT and VACON drives, which offer unique flexibility and adaptability to the motor technology and control system of choice. As an independent supplier of ac drives, Danfoss Drives is not locked into predetermined motor and control system bundles, but instead offers universal compatibility, and the ability to customise.

Drive down costs

No matter how well-optimised the plant design, there is always a way to drive down costs even further. Ac drives are used extensively for just that purpose, extending equipment lifetime, optimising processes, reducing maintenance and saving energy costs.

Innovation makes all the difference. The unique back-channel cooling design of higher power VLT drives and availability of VACON liquid-cooled drives can result in significantly reduced heat loads in switchrooms, enabling the use of smaller, lower-cost air-conditioning systems. The smaller footprint of compact drives saves additional project costs by reducing the entire switchroom design size.

Application-optimised

Application focus in design means that VLT and VACON drives are born robust, with coated electronics and factory testing as standard practice to ensure long life on site.

They are well suited, for example, to optimising operation of long conveyors in excess of 1-kilometre length. Danfoss control solutions for multiple motors with load sharing contribute value by reducing wear and bottlenecks, and maximising the efficiency of material flow to extend belt life. For downhill conveyors, where continuous regenerative braking operation is typical, a Danfoss Active Front End (AFE) drive or alternatively a regenerative drive panel, using a standard 6-pulse drive with separate regenerative module, is the best solution.

All the right features, including long cable compatibility, harmonic and radio frequency interference (RFI) filters, and high temperature resistance to avoid derating - just to name a very few - are integrated into ac drives as standard. This approach eliminates the cost of installing additional components and wiring, and avoids extra post-commissioning maintenance overheads.

Strategic alliance

Other developments since the merger, particularly relevant to the mining industry in South Africa, include Danfoss Drives and the distributor BMG (Bearing Man Group); South Africa recently consolidating a long-standing partnership, with the official signing of a strategic alliance agreement that bodes well for their stakeholders and customers.

"This new development formalises and strengthens the original distribution agreement for Danfoss variable speed drives and the soft starter range, which has been in place since 2007," says David Dyce, division manager, BMG Electronics. "Through this alliance, BMG is set to ensure efficient enquiry turnaround times and a reliable support service for Danfoss systems."

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Completion of technically challenging project

Marthinusen & Coutts, a division of Actom, was recently called upon to assist Goldfields' South Deep Twin Shafts when the mine experienced a failure on one of the stators on its main winder installation.

The physical size of the stator alone is quite unique - especially in terms of the challenges of rewinding such a large unit. The 65 ton stator mass driving a squirrel cage induction motor very probably makes this the largest motor of its type in the world. While there are many larger synchronous motors, it is highly unlikely that there are larger squirrel cage rotor machines.

The six megawatt, 3,3 Hz, eight pole design of the stator makes it greater than a 90 megawatt, 50 Hz, 750 r/min equivalent, and when one adds in the fact that these are driven by cycloconverters, the uniqueness of the installation is apparent.

Following a thorough assessment, it was ascertained that the stator insulation had failed prematurely after approximately eight years, when one would normally expect a 30 year service life from this machine. This failure was unusual in that there was no physical external damage and no signs of overheating. Furthermore with two parallel connected motors one would expect both to fail if a severe external transient was the root cause. The prevailing root cause remained cyclical stresses on the stator insulation due to thermal expansion and contraction cycles.

The identification of the proposed failure mechanism is both new and invaluable in that it identifies a possible weakness with stators. This will allow owners to plan and manage any associated risk. As a result of the root cause of failure identification, the stator winding and insulation has been redesigned, with the objective of preventing a similar failure. The modification made by Marthinusen & Coutts has resulted in a marginal but non-negligible difference to the performance and this, in turn, led to a detailed and very important technical assessment by the cycloconverter drive suppliers.

There are two identical motors mechanically coupled on the single winder so these have to share the load equally, requiring each of the cycloconverter variable speed drives to load the motors equally. The design change required that Marthinusen & Coutts and the international drive OEM establish whether the load sharing would

still be possible with the design modification so as to ensure that this would not impact on the reliable performance of the winders. Once this redesign was carried out and verified the way was paved for the design change to be done. Testing was done at various set stages during the manufacturing process and included dimensional checks, high voltage checks, dissipation factor tests, impulse inter-turn tests. Despite the 1 470 volt rating of the motor, all coils were tested as if they were well in excess of 3 300 volts nominal rating. This is because the cycloconverter driven stator produces voltage spikes. By overrating the insulation - the reliability and longevity of the winder installation has been improved.

Detailed measurements were taken to ensure absolute accuracy in coil manufacture, and these were manufactured to extremely stringent standards which were dedicated to this particular stator; they exceeded the requisite IEEE and IEC standards.

In total some 8 000 kg of copper was used for the rewind of this stator whose assembled mass is 65 ton. The completed mass of the fully assembled motor is 98 ton.

The new stator coils are also arguably the largest set diamond multi-turn coils manufactured in South Africa and on the continent. To add to this challenge resin rich technology was used. Resin rich technology is a challenge to implement even in small size a coils, so producing successful coils of these proportions is an achievement in itself.

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or email richardb@mandc.co.za**



Richard Botton, divisional chief executive officer at Marthinusen & Coutts, Michael Olivier, engineering manager at South Deep, Chris van Heeswijk, electrical consultant to South Deep and Rob Melaia, engineering executive at Marthinusen & Coutts.



The 65 ton stator mass driving a squirrel cage induction motor very probably makes this the largest motor of its type in the world.

Launch of new range VSDs

Schneider Electric has announced the availability of its Altivar Machine range of Variable Speed Drives (VSDs), with the Altivar 320 leading the line-up of new drives for machine manufacturers in Southern Africa. This machine range builds on Schneider's leadership and expertise in machine drives and is designed specifically for machine manufacturers, with benefits including:

Improved machine performance: The Altivar Machine range matches a variety of machine throughput requirements with the following features:

- Open-loop motor control with torque sensitive operation, even at low speed and dynamic accuracy for start/stop applications
- Closed-loop motor control for applications requiring velocity sensitive operation or precise positioning
- Advanced connectivity with automation architecture via all common fieldbuses, even in real-time, with fast task cycle times

Extended machine availability: The Altivar Machine range variable speed drives carry on their predecessors' tradition of robustness and reliability. They are designed to provide

- Continuous machine operation in harsh environments with high

levels of ambient temperature, dust, electrical interruptions, or mechanical disturbances

- Maximised machine operating time, as production changes, maintenance, safety diagnostics, network configuration, and system integration can all to be accomplished quickly

Reduced total machine cost: The Altivar Machine range reduces the overall cost of machines with:

- Reduced installation costs, with both book and compact form factors reducing machine footprint, whether mounted in a machine frame or electrical cabinet
- Fewer additional devices needed to manage machine safety and repeated sequential movements, as both are managed internally within the drive
- Reduced engineering and design time thanks to ready-to-use, PLCopen-compliant libraries and tested, validated, documented architectures (TVDA) available through Schneider Electric's MachineStruxure solutions

Enquiries: Luthando Makiwane.

Email luthando.makiwane@schneider-electric.com

Back-channel cooling

Variable Speed Drives (VSDs) have proven to be one of the most effective ways of reducing power consumption of motors, which reportedly account for about two-thirds of industrial electricity usage.

Additional and significant reductions in consumption can be attained through ensuring that VSDs are installed with 'back-channel cooling': an innovative technological application which is being led in South Africa by **RTS Africa Engineering**.

Back-channel cooling offers a cost-effective way of ensuring that the temperatures within VSDs do not reach levels which risk shortening the life of these devices.

The drives are often located in machine control centres (MCCs) or similar locations which provide appropriate protections, but may become very hot through the combined effects of ambient temperature and the heat generated by VSDs.

Traditionally, site engineers have coped with this problem by installing large air conditioners that cooled the air in MCCs. With back-channel cooling, however, ambient air from outside the control centre is channelled through a VSD, over the heat sink of the device, then vented out from the MCC.

"The critical point here is that the channelled air does not have to be cooled. The steady flow of air over the heat sink keeps the VSD at ambient temperature, which is normally quite acceptable: the drive does not actually need to be kept at a cooler temperature," explains Ian Fraser, Managing Director of RTS Africa Engineering.

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Appointment as Gen Set distributor

Well-known local company **JB Switchgear Solutions** was recently appointed as an authorised supplier of 'Efficient Power' diesel Gen Sets.

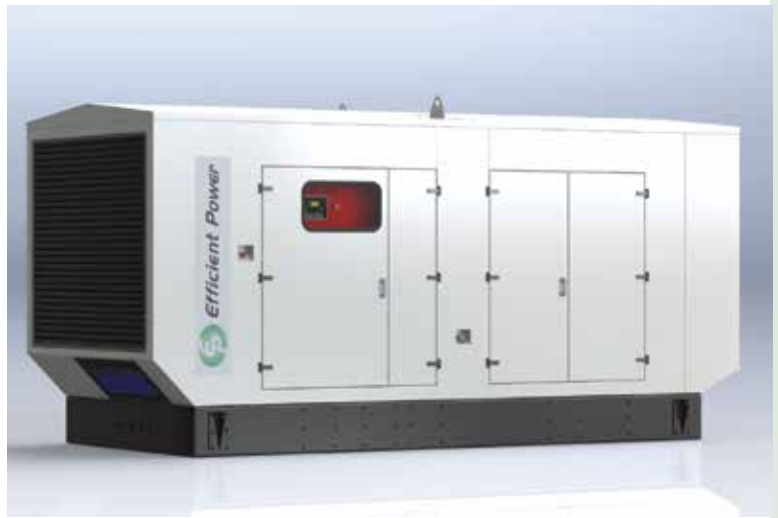
JB Switchgear managing director, Johan Basson, says, "We find the requirement for full electrical solutions growing, due to the reduction of interfaces which are associated with split packages. The inclusion of Efficient Power's range of products will further enhance our offer to market."

These diesel Gen Sets are the result of a manufacturing partnership between Efficient Power and the respected multinational company Sumitomo Corporation Africa. An extensive support and service network will provide customers peace of mind, backed with a full range of parts and service components.

There are standard offerings for stand-alone or mains fail units from 62,5 kVA to 750 kVA, plus numerous multi-set solutions that can easily cover generation capacity up to 10 MVA and above.

"JB Switchgear Solutions was selected as an authorised distributor and reseller based on their longstanding working relationship with the Efficient Group," says Warwick Jackson, managing director of Efficient Power.

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Rotor balancing – high accuracy

Local repairer of rotating electrical equipment, Marthinusen & Coutts says its in-house ability to precision balance rotors to a high accuracy improves vibration levels, thereby increasing reliability while reducing customer maintenance costs. **Marthinusen & Coutts**, a division of Actom, operates the third largest high speed dynamic

balancing machine in sub-Saharan Africa. Mike Chamberlain, marketing executive at Marthinusen & Coutts, says the advanced machine is in constant use with local OEMs benefitting tremendously by having such access to an independent balancing service of this quality and capacity. The 32 ton Schenck HM7 U/S balancing machine is located at Marthinusen & Coutts' 9 500 m² high tech workshop in Cleveland, near Johannesburg. The HM7 U/S balancing machine is 9 000 mm long and has a measuring range between 100 and 5 000 rpm. It has a journal size of 400 mm and a swing of 2 400 mm. It is fitted with a CAB 920 H measuring instrument with a vector display. Its state-of-the-art technology makes changeovers to new rotor types quick and straightforward. "The machine facilitates the balancing of all larger high speed rotors dynamically at full operating speed and sometimes, depending on the design of the rotor and customer requirements, at 10% overspeed," Chamberlain says.



All rotors are balanced in-house which speeds up the process and reduces costs with the service being available to external customers on a first come, first served basis.

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Figure 1: Liquid flow calibration rig.

Traceability and validation of liquid flow measurands

Dr. Nicolaus Mathies, Krohne Messtechnik GmbH, Duisburg

This article describes the requirements on liquid flow meters with regard to the measurement accuracy.

Measurement of flowing liquid in closed conduits is present in many different applications in our daily life, e.g. water or heat metering, gas metering, filling stations, in the chemical industry, the food industry, for batching or for process regulation. Usually liquid flowmeters are used to fulfil most of these requirements. The demands of the application on flow meters are high. We have a general expectation that meters 'show the correct value', which is necessary for correct billing. Without external help it is normally impossible to check whether a flowmeter shows the correct values or not. Behind the accuracy of flow meters is a relatively complex system of calculations, standards, normative documents and special calibration facilities with special knowledge of the operators.

The transfer of measurable goods is regulated metrologically in the area of custody transfer measurement by the European Measuring Instruments Directive 2004/22/EG [1] the German Mess- und Eichgesetz [2] and the Eichordnung [3]. The requirements for suitability, usability and application area are covered under general definitions. Special requirements for flow meters are defined depending on the different applications. Maximum Permissible Errors (MPE) depending on the measurand (m³, kg or kWh) define the 'accuracy requirements' for the meters, which have to be fulfilled by every single meter.

Many technical official standards and documents are available which the basis for comparable and repeatable measurements is. In industrial metrology, many referenced guidelines for process applications exist to ensure correct installation of flow meters, where the application can influence the meter measurement.

To achieve reproducible results and meters which can be replaced one for another, the flow meters have to be calibrated with the same reference condition, which leads to traceable and comparable measurements.

Traceability of measurements

The transfer of measurable goods generally requires a consistent measurement of the units which are used like kilogram or metre. The question about a standard definition of the measurands was discussed by the ancient Egyptians and Romans. The goal of the discussions was to achieve equal, comparable and reproducible values of a measurand so that a fair trade of the goods could be realised.

Definitions of reference lengths and reference weights can be found in a lot of different areas of measurement. For a long time in Europe these definitions were established by the local kings.

The result was a huge number of different standards for the kilogram, for example, and difficulties in conversion of these standards. In 1875 with the Meter convention 17 different European countries signed a contract to use the same reference kilogram and the same reference meter and to establish an institution to keep these standards.

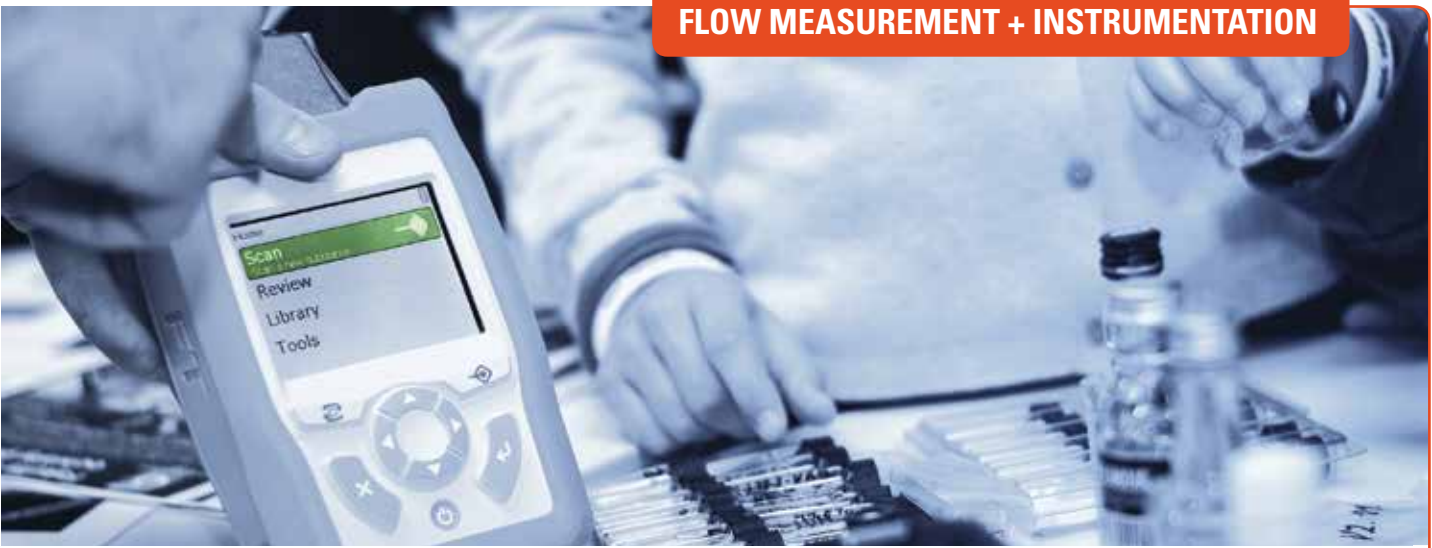
For the first time this allowed traceability on the same standards. Up to the present 51 states have signed this contract [4] and there are two associated states. In addition to metre and kilogram, five new measurands have been added. Since the 13th general conference of mass and metre (CGPM) in 1960 the system is called SI-System, the international unit system.

The SI-units today are kilogram, metre, second, Kelvin, ampere, mole and candela. The transfer and traceability of the SI-units has to be done by the national metrology institute of the different countries. In Germany this is done by the Physikalisch-Technische Bundesanstalt (PTB).

The technical definitions of the SI-units can be found at the homepage of the PTB [5]. Next to the SI-units several additional derived units exist, for example typical flow units as l/h, l/s, kg/s or kg/h.

”

The measurement of flowing liquids in closed conduits is present in applications in everyday life.



Reference methods

Liquid flow measurement is generally used for example for the measurement of cold potable water, heat metering applications, gas measurement or fuel dispensers, truck, rail, or ship loading applications. In addition, industrial processes are sometimes coupled to flow measurement. For the calibration of all these flow meters, different reference methods can be used, depending on the required measurement uncertainty of the meter under test and the application.

Reference meter: The meter under test is calibrated with another flowmeter of the same or different construction. Usually more accurate master reference flowmeters which have been specially selected are used. The metrological behaviour (measurement uncertainty, repeatability and reproducibility) of those meters is well known and the meter has a long calibration history. If liquid flowmeters are to be calibrated, usually calibration rigs with a circulating flow are used. The medium is taken out of a collection tank and pumped into the measuring section, where the meter under test is mounted. Within the defined calibration time the meter under test is compared with the reference meter. Sometimes the error curve of the reference meter is corrected during the calibration of the meter under test. Of course the minimum measurement uncertainty which can be achieved is at a medium level, because a reference flowmeter must be calibrated elsewhere with another reference standard with a smaller measurement uncertainty. Depending on the physical principle of the meter under test, the reference meter method is used for many industrial calibration processes. *Figure 1* shows a liquid flow calibration rig with several Electromagnetic reference meters.

Gravimetric weighing system: With more stringent requirements of the measurement uncertainty for flowmeter calibration, liquid flow calibration rigs are used as a reference [6]. The flowing liquid is measured by a weighing scale (mass), a temperature measurement (density) and a time measurement see *Figure 2*. The medium is taken from a collection tank and directly (or with a constant header tank, not shown in *Figure 2*) pumped into the measuring section. The meter under test is mounted in the measuring section. The medium passes through the meter under test and flows through a reference and flow control valves into the weighing tank. The calibration method shown is the standing start stop method, where the medium is directly pumped into the weighing tank from the start of the pumps. If the flying start stop method is used, the medium is diverted with a liquid flow diverter during the measuring time into the weighing tank. In the meantime the liquid is pumped back into the collection tank [7,8]. The standing

start stop method avoids the influence of the liquid flow diverter, but of course the error curve influences the result of measurement uncertainty of the calibration.

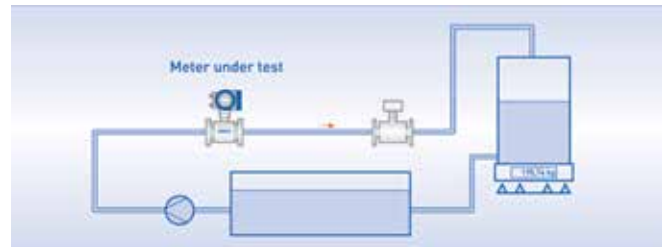


Figure 2: Gravimetric weighing system.

Volumetric calibration system: If volumetric measurands have to be calibrated, then volumetric references are used for the calibration. The volume of a flowing liquid is compared with a tank or prover system or any kind of reference volume with a small measurement uncertainty. As mentioned for the gravimetric weighing systems, the volumetric calibration systems can be used in the standing start stop method if a reference volume is used with or without a liquid flow diverter. For example, a concrete volumetric reference tank is used in conjunction with level measurement at the local Weights and Measures authority in Düsseldorf, Germany for the calibration of cold water meters. Compact systems with a smaller maximum flowrate than the reference tank systems are realised today as prover systems. Here the reference volume is defined by a cylinder. A piston displaces the medium and brings the medium through the meter under test. These systems are limited for the maximum flowrate and maximum velocity through the meter under test.

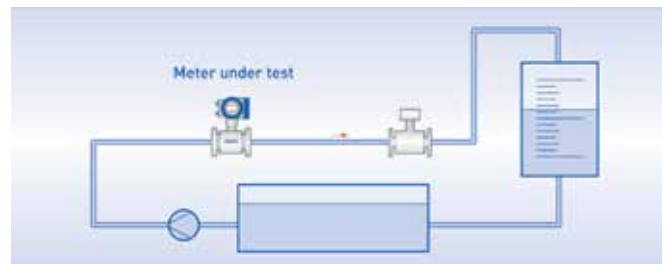


Figure 3: Volumetric reference system.

Validation of measurements

The validation of measurands for liquid flow measurement is a more complex thing compared to the other SI-units. A direct comparison

as it is done for mass units is not possible because of the complexity of the liquid flow calibration systems. For a description of the measurement accuracy for the calibration systems, measurement uncertainty calculations are used [7] and afterwards validated with key comparisons between the calibration rigs. This is usually done with reference flow meters, which have been tested and characterised for a long time so that the measurement history of the instrument is well known. These liquid flow meters are called comparison standards, because their flow scale is used for a comparison of the flow scale of different liquid flow calibration rigs. Key comparisons can be done in different ways, see Figure 4.

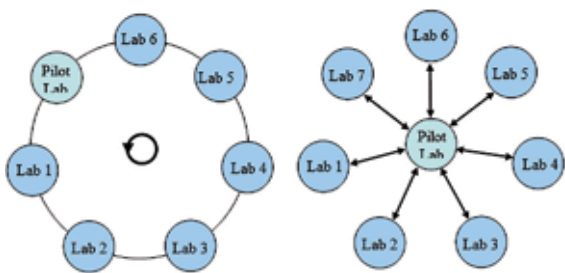


Figure 4: Different structures of key comparisons.

The structure of a key comparison can be realised as a circle or a star, as shown in Figure 4. Comparisons which are organised in a circle rotate the reference flowmeter after it has been measured in the pilot laboratory. At the end of the circle it is measured in the pilot laboratory again. Measurement errors which occur when the reference meter is measured at the different laboratories can't be detected during the comparison so that establishing the time of the error is difficult. A comparison which is organised in a star structure improves detection of measurement errors. Here the reference meter is measured at the beginning in the pilot laboratory and afterwards in another laboratory which sends the meter back to the pilot laboratory. In this case measurement errors can be detected quickly. In practice combinations of both structures are used. The District Heating Working Group (AGFW) key comparison uses a combination of the circle and star structure for a comparison of calibration rig for the flow sensor of heat meters [9]. Before a comparison takes place, the goal of the comparison, the measurement uncertainties of the calibration rigs, flow rates, pressure, temperature of the medium and the measured quantity have to be precisely defined. The investigation of a standard calibration including calibration procedure and operators has been done in [10].

Conclusion

Normally we accept the quantity of the measured medium which is displayed by the flow meter without being able to check technical details of the meter. For this, a wide range of technical descriptions, approvals, standards etc are available. Liquid flow meters are calibrated depending on the requirements for the measurement accuracy with different reference systems like reference flow meters, gravimetric or volumetric calibration systems. Therefore a lot of different influences on the reference systems have to be taken into account. These are

described in a measurement uncertainty calculation of the system. The validation of these calculations can be done with key comparisons, which considers the expected measurement uncertainty of the comparison, the rigs, and different reference flowmeters. The result of the sum of requirements for the comparison provides a general way to compare liquid flow measurements at different locations with a traceable accuracy and acceptance of the meter measurement trueness at the end customer.

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- Liquid flow measurement is generally used for the measurement of cold, potable water, heat metering, gas measurement or fuel dispensers, truck, rail or ship loading.
- Industrial processes are often coupled to flow measurement.
- For the calibration of the flow meters, reference methods depend on the required measurement uncertainty of the meter under test and the application.



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Measurement technology for tunnel drainage

After 20 years of planning and construction, Switzerland celebrates the completion of the Gotthard BaseTunnel. At 57 kms, it is the world's longest railway tunnel. 2 300 metres of solid rock rises above the new line at its deepest point. The construction must not only withstand extreme mountain pressure but also substantial volumes of mountain water must be prevented from seeping in. To make sure the entire tunnel stays dry, two drains were laid in the floor of each of the single-track tubes. The drainage system separates the (clean) mountain water from the (mostly clean) wastewater that is drained off for removing impurities during operations or in the event of an accident. Every second, five liters of wastewater are carried away from each tunnel tube in every direction. The water is collected in catch basins at both ends of the tunnel and checked for any pollution.

The measurement technology for the tunnel drainage originates from process automation specialist **Endress+Hauser**: 180 instruments, some explosion-protected, and three measuring panels detect flow volumes and levels of mountain and wastewater, conductivity, the pH value and the turbidity of the wastewater. For Stefan Bürki, the project manager in charge of the project at Endress+Hauser Switzerland, the installation has a very special meaning and stated: "I am proud to be part of this once-in-a-lifetime project!"

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KOBOLD Instrumentation, represented in South Africa by **Instrotech** – a Comtest Group company, is offering their model KSV flow meters and switches for very low flows with and without control valves – so even the lowest possible liquid or gas flow rates can be measured. Specifically for liquids or air, the KSV operates on the suspended float principle. The direction of flow is from bottom to top, and the installation position is vertical. The indication point is the upper edge of the ball. The device has been designed as a simple, and thus economical measuring system. The optional needle valve allows economical control and the device has been designed for panel mounting. Kobold's KSV flow meters are acid and caustic-proof, made of polycarbonate and brass or polysulfone and stainless steel materials. They are highly suited for advanced applications in medical technology because these units are sterilisable, operating at temperatures of +120°C. They can also be used for a wide range of applications in the analytical instrumentation field, within production and environmental monitoring, as well as in laboratory measurement and monitoring technology.

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Smart communicator App for android update

ProComSol has introduced a major update to its DevComDroid App, an Android based Smart Device Communicator Application for HART instruments. The App uses the Device Descriptor (DD) for the connected HART device so the user has full access to every Parameter and Method. According to Jeffrey Dobos, President of ProComSol: "This update has significant user interface improvements that make it even easier to configure HART instruments in the field. With just a few swipes of your finger, on hardware that can fit in your pocket, mobile HART device configuration continues to get easier and faster."

The Android App (DevComDroid), in combination with a Bluetooth HART modem, is a full functioned HART Communicator. The entire DD Library from the FieldComm Group is included. New DDs can be added very simply by the user. A HART communicator that uses DDs can perform full configurations of valves, multi-variable devices, and complex devices such as radar level and Coriolis flow meters. The improved user interface is modern and intuitive. No training is required. The Bluetooth wireless interface between the HART modem and Android device provides user safety and comfort. There are no wires to tangle or trip over.

DevComDroid allows the user to view and edit device parameters and even save all the device parameters as a PDF file. The PDF file can then be shared with anyone in the world via the mobile network connections in an Android device. Saving and sharing HART device

configurations is now faster and more convenient. ProComSol was founded in 2005 and has become the leading provider of technically advanced, cost-effective communication solutions to the HART marketplace. The president, Jeffrey Dobos, has 16+ years' experience developing products with HART technology. The company also designs and manufactures RS232, USB, and Bluetooth HART modems. In combination with the modems, the company's Smart Communicator Software is used to convert a PC, Tablet, or Smartphone into a full featured, DD-based HART Communicator. **Krohne** is an authorised distributor for ProComSol.

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Ratio pyrometer with new switchover technology

LumaSense Technologies, Inc. has introduced the IMPAC IGAR 6 Advanced infrared thermometer. The IGAR 6 Advanced is a digital, compact pyrometer with 1-colour, 2-colour, and Smart operating modes for noncontact temperature measurement in ranges between 100 to 2 000°C. **Mecosa** is the sole agent for Lumasense Technologies GmbH in Southern Africa.

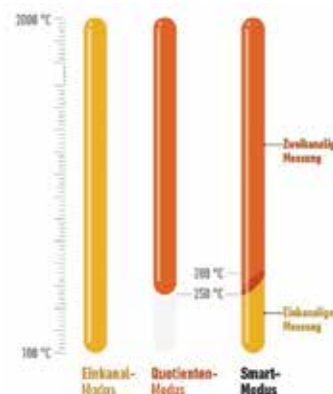
"This product is unique not only because of the wide temperature range, but because of our seamless 'switchover' technology," stated Daniel Schueftan, LumaSense's global product manager for pyrometers. The "switchover" technology, known as Smart

Mode, allows the pyrometer to measure temperature in 1-colour mode at low temperatures (100 to 250°C) and then transition to 2-colour mode to provide the advantages of measurements in ratio mode at higher temperatures (280 to 2 000°C). The automatic, smooth transition from 1-colour to 2-colour measurement occurs between 250 and 280°C. In addition, the pyrometer can operate in 1-colour mode (100 to 2 000°C) and 2-colour mode (250 to 2 000°C).

"The large temperature range, compact size, and new Smart Mode make the IGAR 6 Advanced pyrometer ideally suited for many different industrial manufacturing

applications," said LumaSense chief executive officer, Stephen Abely. Sample applications include induction heating, hardening, tempering/annealing, brazing, sintering, vacuum processes, coating, and laser heat treatment. Attendees at the Sensor and Test Expo in Nuremberg, Germany and AISTech in Pittsburgh previewed the instrument recently and raved about the large temperature range, the different operating modes, and other features such as the automatic emissivity determination and optional line optics. These additional features make this instrument unique and create opportunities to measure processes not considered previously and those not measured with appropriate accuracy.

Enquiries: Tel. +27 (0) 11 257 6100 or email measure@mecosa.co.za



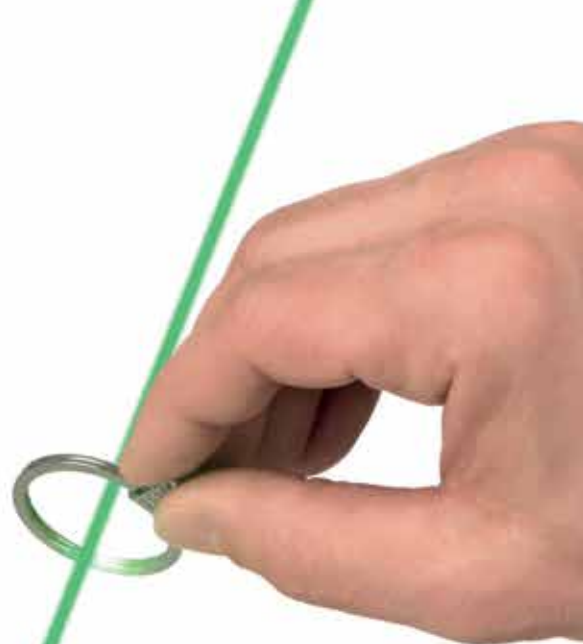
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Assessing control valves and their performance

Jim Shields, Fluke Corporation

What are the types, what can they be tested for?

When assessing control valves and their performance, you need to understand the different types of valves and what they can be tested for. For open/close shutoff valves without analog control the tests are pretty simple.

Do the valves open and close? When open, do they open all the way? When they close, do they close completely? Testing is mostly observational – looking at the valve and watching cause and effect in the process during the cycle.

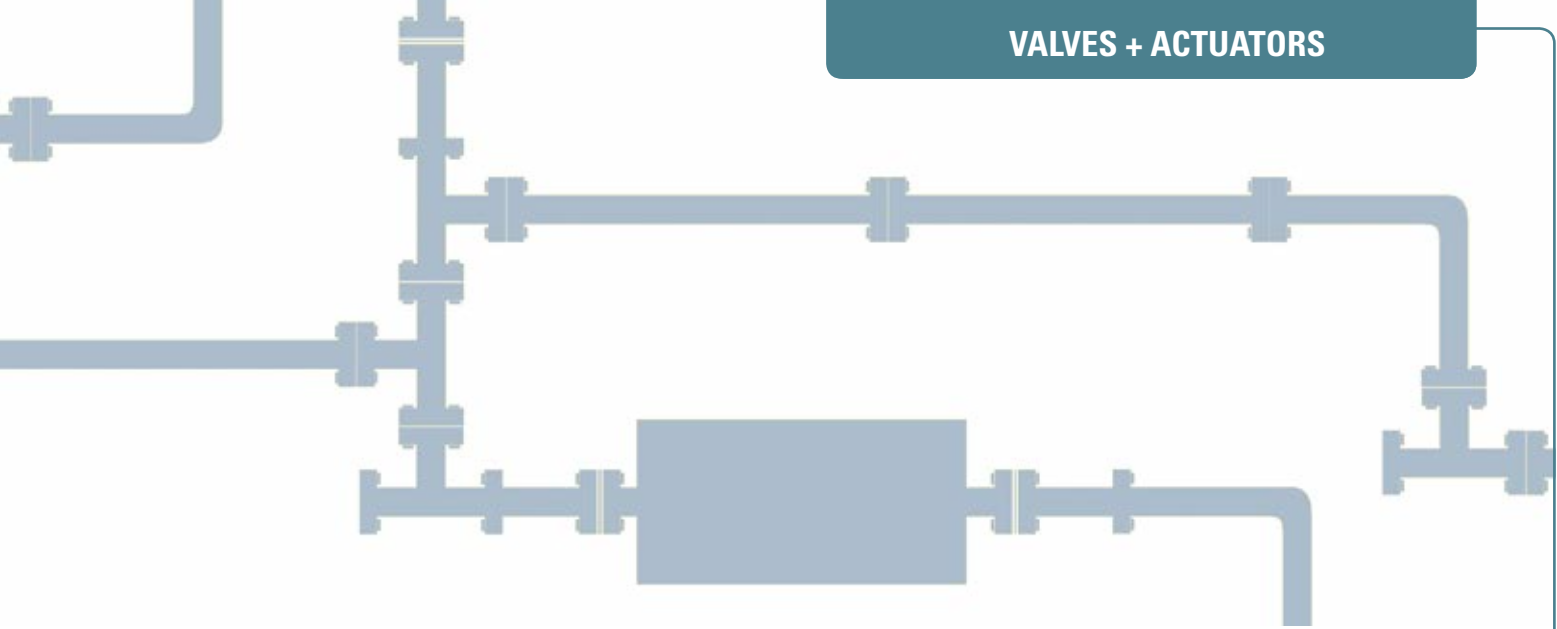
Control valves are a different ‘beast’ altogether

These valves open and close proportionally, and vary the degree of travel depending on the percent of span of the 4 to 20 mA signal applied to them. Observing the valve’s position, as reported on the visual

travel indicator, gives the technician or operator a rough indication of percent of travel for a particular setting when in operation - but does not provide any assurance of how the valve will operate under dynamic and changing conditions.

The most sophisticated valve performance tests require removing the valve and testing its performance on a ‘valve prover.’ This is an expensive test device, out of range for most instrument shops. The valve prover is often only used by valve manufacturers in testing the valve when shipped, or by highly qualified field service engineers. It offers a very complete test, but the tool is not feasible for most instrument shops.

So, what is the technician to use for testing a control valve? What is a meaningful test that can be used as a baseline? Since most valves use a 4 to 20 mA input signal, any test tool with an mA output signal



can provide the input mA signal to drive the control valve across its operating range. When applying a 3,8 mA input signal to a normally closed valve, the valve should be hard closed. It should remain closed at 4,0 mA and move slightly off its seat at 4,2 mA.

At the other end of its operation, at 19,8 mA, it should be nearly fully open. At 20,0 mA it should be fully open, and hard open at 20,2 mA (resting on the travel stop). Tests of this nature will determine if the valve is opening and closing correctly, but still fall short of testing the valve across the entire range where it provides control.

Many valves, including those that are 'smart,' have a feedback element built in that outputs the actual position as a percentage of open/close. This output can be a 4 to 20 mA signal or a digital HART variable that represents 0 to 100% of control valve operating span.

Applying a varying mA signal, while simultaneously monitoring the output mA or percentage of span signal, gives a technician a means to see whether a control valve is operating correctly over its range.

By recording simultaneously the applied mA signal and the output mA signal or PV percentage of span, the valve's performance can be documented. This documented test and result is often called a valve's 'signature.' The output should smoothly mirror the applied mA input signal. Any deviation from the applied signal is a potential indication of aberrant behavior by the valve.

Maintenance strategy can reduce costs

A best-in-class maintenance strategy for control valves can reduce costs by both minimising the number of valves pulled physically from processing and minimising failure risks. To establish such a practice, the baseline condition of the valve at a known good state needs to be documented.

Ideally the documentation occurs when the valve is commissioned or after it is overhauled. The technician records the signature of the valve in the ideal state, plotting the output mA or percentage of span signal versus applied input signal, and stores this information with the time, tag number of the valve, and the date the activity is performed. Calibration management software can be used to manage this information.

Once the baseline performance signatures of the valves are recorded, a maintenance interval for testing the performance of the

valves needs to be established. Using existing maintenance intervals is a starting point. If there is no established maintenance interval, the service location of the valve needs to be evaluated.

Rough service applications dictate a shorter maintenance interval than light duty service, for example. An interval of six months to a year to start (unless the service location is very hard on the valves) is a reasonable starting point. Some devices installed in safety and shut-down systems need to be checked every three months regardless of service location.

Conclusion

Once baseline valve signature data is recorded, the valves need to be tested at the defined intervals and the signatures recorded. The signatures can be compared to the baseline signatures to determine changes in their performance.

If the output response curve has developed a nonlinear signature or has aberrations in the curves, the valve may be developing excessive stiction or hysteresis that may require it to be removed for service.

”
Some devices installed in safety and shut-down systems need to be checked every three months.

- Sophisticated valve performance tests require removing the valve and testing its performance on a 'valve prover'.
- The documented test and result is called the valve's 'signature'.
- Once the baseline performance signature of the valve is recorded, a maintenance interval for testing its performance must be established.

take note



Jim Shields – Fluke product marketing manager - manages the product marketing mix for field calibration, incorporates customer VOC (Voice of Customer) into new product innovations, and handles 'Best Practice' in managing instrument maintenance and calibration for Fluke Corporation (Danaher Company), Seattle in the USA. Enquiries: Comtest. Tel. +27 (0) 10 595 1821 or email sales@comtest.co.za

Ensuring uninterrupted service for energy sector pumps

KSB Pumps and Valves is ready to assist Independent Power Producers (IPPs) by acting as a fluid transfer technology partner supplying pumps for renewable energy

plants, and to offer support. According to Stefano Testi, who is responsible for the energy sector at KSB Pumps and Valves, the company is eager to play a role in the

development of clean power alternatives. "We have the ability to transfer knowledge and skills from across the globe for all forms of power generation, whether it be renewable energy or traditional forms, to our local manufacturing facility and invest in the technology required to procure and manufacture world class pumps locally.

Not only will this support the local energy market, but it also ensures that local content requirements are met with world class products. In terms of nuclear power, we are perfectly positioned to supply and support local efforts wherever and whenever they come to fruition.

We are also in a position to lend expertise to other emerging power generation technologies such as concentrated solar energy that is becoming a viable solution for IPPs in this country especially considering the amount of sunshine days in southern Africa."

Enquiries: Annett Kriel. Tel. 27 (0) 11 876 5600 or email Annett.Kriel@ksb.com



Latest developments in fluid technology

"**BMG** boosts its fluid technology services with dependable technical support to ensure optimum safety, efficiency and extended service life of every system, even in corrosive environments. With broad technical capabilities, the team is able to solve problems, in applications where conventional components have failed after short periods of service," says Wayne Holton, fluid technology manager, BMG – Bearing Man Group.

"BMG's fluid technology services also cover project engineering and consulting, cylinder design and manufacture, training, repair and testing, as well as onsite container services."

The company's extensive range of components for fluid technology systems and general industrial applications, includes valves, hydraulic hoses and fittings, accumulators, cylinders, heat exchangers, hydraulic motors and hydraulic plumbing, as well as pumps and reservoir accessories.

"Compact butterfly valves, with good flow characteristics and low maintenance requirements, are important components in BMG's extensive range of valves for industrial flow control," says Willie Lamprecht, national product manager valves, BMG.

An advantage of using quarter turn butterfly valves rather than any other type of valve, is the simple, wafer shaped design, with fewer parts, for easy repair and minimal maintenance. Although butterfly valves and ball valves are both quarter turn, the benefit of butterfly valves is when they are actuated pneumatically, they open and close very quickly. Unlike a ball valve, the disc of butterfly valves is always present in the passageway within the flow.

BMG's Desponia centric butterfly valves (DN 25 -1600) with an elastomer liner, are designed for safe and reliable regulation of liquids and gases in diverse industries.

Bianca centric butterfly valves (DN 32 -900) with an on/off and control service, have a durable plastomer liner suitable for aggressive and corrosive fluids. Special ATEX valves in this range are suitable for use in explosive atmospheres.

Enquiries: Wayne Holton. Tel. +27 (0) 11 620 1500 or email wayneh@bmgworld.net



A company first

When it comes to multi-tasking, **SMC** has it under control. By listening and responding to our customers' ever-changing needs, up to four electric actuators can now be controlled simultaneously for single or multiple axes using SMC's latest controller, the JXC83. Providing a comprehensive and flexible solution for customers, this latest controller offers several vital savings including equipment costs, programming time, wiring and space.

Launched in 2016, the worldwide leading expert in pneumatics brings you a controller which is compatible with majority of the actuators in SMC's LE range. It also uses minimum wiring due to a common power supply cable and less I/O cable is required thereby reducing overall costs.

Ernst Smith, SMC Product Manager explains how, amongst its savings, the JXC83 also reduces labour time for increased productivity in the workplace, "All four axes of this

controller can be set with just one connection ensuing easy programming and minimal hassle," explains Smith.

Smith continues: "By introducing the JXC83, we have responded to market needs for a single controller that is flexible and simple to set up. By also giving our customers a range of savings, we believe this latest controller from SMC will meet the demands of those working within general industry,"

The JXC83 has the capability to move two axes with arc interpolation or three axes with linear interpolation at any one time in certain conditions. "The JXC83 will greatly benefit the general industrial machinery sector and is suitable for a range of applications such as pick and place, and vertical board lifting." Concludes Smith.



Ernst Smith.



Enquiries:

Email sales@smcpneumatics.co.za or visit www.smcpneumatics.co.za

A prize-winner of '100 places for Industry 4.0 in Baden-Württemberg'

With this competition, the federal state of Baden-Württemberg awards prizes to companies who are already developing and implementing innovative solutions for the intelligent networking of production and value creation processes in their daily activities. In addition to the level of innovation, the assessment primarily considers practical relevance with regards to Industry 4.0.

As a prize-winner, **GEMÜ** will receive an honorary certificate for being named one of the '100 places for Industry 4.0 in Baden-Württemberg". In addition, the companies receiving awards will be listed on the Allianz website and recorded in the Competence Atlas for the federal state of Baden-Württemberg. "CONEXO translates the buzzword 'Industry 4.0' into genuine customer benefits. We are delighted that this approach is attracting interest," explains Marco Becker, Head of Sales Marketing.

GEMÜ presented the future of intelligent valve technology under the name of CONEXO last year. Through the interaction between valve components equipped with RFID chips and an IT infrastructure,

comprising a mobile and a stationary software solution, the CONEXO system is actively improving process reliability. GEMÜ CONEXO helps customers to understand and interpret the procedures in their systems even better and always with a higher-level objective in mind – to increase system availability.

Enquiries: Visit www.gemu-group.com



New compact high vacuum system launched

In an effort to provide the market with technology that improves productivity and reduces maintenance and downtime, **Oerlikon Leybold Vacuum** has added the TURBOLAB to its product portfolio. The TURBOLAB is a compact, fully assembled and ready-to-operate high vacuum system with application in laboratories, spectroscopy and micro balances as well as sputtering and evaporating systems.

John Russell, business development manager at Integrated Pump Technology, distributor of Oerlikon Leybold Vacuum products within southern Africa, says the system, which has just been launched, is available in either table-top or mobile cart variants. The table-top variant has a new diaphragm backing pump for industry proven TURBOVAC iTurbomolecular pumps, which attain ultimate pressures of between 10⁻⁷ to 10⁻¹⁰ mbar and pumping speeds for N₂ of 65 l/s to 430 l/s, depending on the model selected. TURBOLAB can be tailor made to individual customer needs with a choice of up to six connected accessories that include purge gas or venting valves, cooling units, heater collars and vacuum measurement devices, all connected through built-in communication ports.

Enquiries: John Russell. Tel. +27 (0) 82 614 9517 or email john@pump-technology.com



Helping communities adapt to Climate Change

Approaches to drought and flood in North-Central Namibia

Margaret N Angula and Dian Spear, *Adaptation at Scale in Semi-Arid Regions (ASSAR) project*

In the community of Onesi in Omusati region in north-central Namibia along its border with Angola, farmers and residents know only too well the catastrophic effects of alternating drought and flood.

Much of Namibia's rural population ekes out a meagre existence on marginally fertile soil, almost wholly dependent on the arrival of rain at the right times. Even small changes in temperature, evaporation and the scale and timing of rainfall can have a devastating effect. In the Omusati region local crops and livelihoods centre around millet and maize, with farmers starting to grow Mahangu millet and other food crops including ground nuts, wheat and sorghum. The villagers also harvest the mopane worm and rear livestock (mainly beef cattle, sheep and goats) and donkeys help with the ploughing of the land. However, the agricultural output in Namibia, and especially in this Northern region, is seriously and increasingly impaired due to adverse climatic and soil factors.

During the past five years the people of Onesi, along with many of the neighbouring communities, have suffered recurring drought, floods, locusts, insects and outbreaks of various pests. Many of these communities have little access to utilities and services such as water, health and transport services and this makes them more vulnerable to these events.

Floods... impact on all services, including electricity transmission

Floods have become an almost annual occurrence in Namibia and cause major problems in the densely populated areas. Buildings are often situated in or near the floodplains, meaning that when floods hit, homes and businesses are destroyed. Roads also often suffer, cutting off homes and services such as schools and healthcare facilities. As flooding becomes more frequent and more intense due to climate change, it is likely that these impacts will increase causing greater damage to buildings, road and rail infrastructures, dams and water pipes, electricity transmission, communications, sewerage and drainage systems.

Most recently, in February 2016, Onesi once again experienced flooding. The floods displaced about 250 people who relocated to higher ground. About 86 homesteads were extensively damaged,

while several schools and churches were deluged by the heavy rains and mahangu fields submerged, leaving the affected villagers without food and shelter. Most of the relocated people were mothers with babies, schoolchildren and people with disabilities in the Onesi and Ruacana constituencies of the Omusati Region.

At a workshop in Outapi in March we heard many first-hand accounts of how this affects individuals in the community. Beata, an elderly potter and basket-maker in Onesi, gave us her account of the effects of drought on her business, livelihood and her life, vividly bringing home the problems the community faces on a regular basis. Beata's 'underground house' that she uses for the production of her clay pots has been flooded five times in recent years.

As a result of this, she has moved her pottery house and hopes it will not flood this year.

From one extreme to another

At the other end of the scale are the problems with drought – dry spells in 2013 and 2014 were longer and more severe than in the past and many livestock and crops failed. Over the two-year period, the weak or absent rains left at least 500 000 people needing emergency food aid – and many are questioning whether global warming and climate change will bring an even hotter and drier future. Periods of drought are equally disruptive to power supply as the problems of floods. When rainfall is low the level of the Kunene river drops and generation in the country's hydropower plant at Ruacana is reduced. The power plant supplies most of Namibia's domestically-produced energy and about half of the country's electricity supply.

Recent reports from the Government in Namibia have highlighted that the past 40 years have shown increased temperatures, with an increasing number of days recording a high of over 35°C, and the trend is expected to continue. At the same time fewer consecutive wet days have been observed, in other words - there have been longer dry spells. On the other hand, there may be an increase in rainfall in the future, which may sound positive, except that the rain itself is



likely to become more intense and of short duration, which may in turn exacerbate the risk of flooding, especially if it falls on dry ground.

Adapting to new climate conditions – a knowledge-sharing approach

Acutely aware that they must find long-term solutions to these climate change induced events, the farmers and inhabitants of Onesi, like many of their compatriots, are keen to work with experts and develop new approaches to enable them to adapt to their situation.

On 8 and 9 March 2016 researchers from the ASSAR (Adaptation at Scale in Semi-Arid Regions) research project, working with the local community, held a Vulnerability and Risk Assessment (VRA) workshop at Outapi Town Lodge in Outapi, Omusati Region Namibia.

The aim of the workshop was to discuss the problems faced and to facilitate discussion, knowledge-sharing and examine approaches to combat the effects of drought and floods in the community, both in terms of alternative livelihoods, and in developing adaptation measures for the existing agricultural livelihoods.

The workshop brought together a diverse group of stakeholders to discuss how hazards such as drought, flood and high temperatures affect the Onesi constituency. Amongst the group were representatives from the Onesi community, the Traditional Authority, the Red Cross, the Ministry of Environment and Tourism, SCORE project, the Constituency Development Committee, Onesi Constituency Office, Olushandja Horticulture Association, the Ministry of Youth, Sports and Culture, Ministry of Agriculture, Water and Forestry, and the Omusati Regional Council. The attendees represented a wide range of different community livelihoods – crops, livestock, wild food harvesting and handcrafts.

The Onesi farmers that were present hoped to receive information to help them gain a better understanding of climate change and what

people in other communities and countries are doing to cope with droughts and floods. They stressed how useful knowledge-sharing is in learning new methods that have worked in other regions – some of the Onesi farmers had travelled to Zimbabwe to learn more about commercialising the harvesting of Mopane worms.

Whilst drought, flood and high temperatures were identified as the most important issues for the communities, other factors highlighted included theft of stock and the fact that, when there was rain in the area, people from surrounding areas would arrive looking for food. So there would be cases of people from Angola or surrounding regions such as Oshana and Oshakati arriving with their children and wanting to be accommodated and fed by extended families and friends.

The workshop highlighted many of the long-term knock-on effects of floods and drought – both cause soil erosion and loss of soil fertility which results in poor harvests, poor grazing and loss of livestock. This in turn can lead to malnutrition, and other effects on the social and economic aspects of daily life, including the migration of men and young people to urban areas to find alternative livelihoods. The changes in climate also alter the region's biodiversity with a loss of wildlife and birds and also aquatic life. Flooding also displaces people and threatens their safety in the short term, destroys or damages infrastructure such as roads and buildings and can bring water-borne diseases that cause additional health issues.

Water, power and working practices

The Outapi workshop identified a number of responses to these wide-ranging issues, including existing responses that can be strengthened and new measures that could be trialled. Whilst the Government and regional authorities have done much to provide flood and drought relief, it is the long-term measures of adaptation implemented by communities like Onesi that will make the difference and the resi-

dents are themselves very aware of this. They are already looking at adaptation measures such as growing drought-resistant crops and timing planting to fit with expected rainfall patterns. Livestock farmers also are aware that they must manage their herds to reduce numbers when drought is expected in order to preserve a few animals to breed from at other times.

With flooding also a major issue for the community, farmers are also looking at crops that are resistant to floods, such as rice. At the same time households are relocating to areas above flood levels, and calling on the authorities not to allocate land for building that is in the flood plain land.

In terms of more long-term infrastructure approaches, one measure being discussed is the building of earth dams to combat water scarcity, harnessing the times of high rainfall and flooding to offset the periods of drought.

Residents see the potential both to protect people from flood but also to store water for use for seasonal vegetable gardening such as tomatoes, onions and water melons, as well as providing water for crops and livestock.

Improved drought management strategies must also include enabling greater access to available water in the wider region. The regional drought management strategy already in place can be built upon and strengthened at multiple levels in the future.

One of the key factors highlighted by farmers is the need to have greater access to climate information and weather forecasting, to help them adapt their agricultural practices to accommodate expected events of both flooding and drought. Onesi is still relatively remote with little access to newspapers and broadcast media such as radio and TV. Mobile telephony has reached the community and there is access to grid power in the centre of the village but network coverage is difficult and access to climate information and seasonal forecast updates therefore at best intermittent.


In addition, more advice is needed on how to use seasonal climate forecast information, making community members more aware of existing opportunities and how to obtain assistance to implement some of these ideas, working with the Constituency Development Committee, the Settlement Development Committee and the Traditional Authority. Adapting to climate change is a partnership at local, regional and national levels

Conclusion

Adapting to climate change is a long-term, collaborative, iterative process. The ASSAR team continues to work with the people of Onesi and similar communities to help them make the changes necessary to respond to their changing climate and to share this information with other communities that can learn from the experiences of Onesi. Further workshops later in the year will look at stories around possible

futures and will include examining potential strategies that could be put in place. Plans are in discussion to set up a community exchange between some of the ASSAR study communities in Namibia, Botswana, Ghana, Mali, Ethiopia, Kenya and India. The aim is to enable community champions to spend some time in a community in another country and learn about their livelihoods and the adaptation measures they are implementing.

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The hydropower plant at Ruacana supplies most of Namibia’s domestically-produced energy and about half of the country’s electricity supply.



take note

- Floods in Namibia occur almost annually.
- Periods of drought are disruptive to power supply... as are the floods.
- Adapting to Climate Change is a long-term, collaborative, iterative process.



Margaret Angula is the Namibia lead for the Adaptation at Scale in Semi-Arid Regions (ASSAR) project.



Dian Spear is the Southern Africa lead for the ASSAR project.

The international and interdisciplinary ASSAR team comprises a mix of research and practitioner organisations, and includes groups with global reach as well as those deeply embedded in their communities. Adaptation at Scale in Semi-Arid Regions or ASSAR is a five-year research project (2014 – 2018), funded by the Canadian International Development Research Centre (IDRC) and the UK Department for International Development (DFID). It aims to deepen understanding of climate vulnerability and adaptation in semi-arid regions and to inform and influence climate change adaptation practice and policy. It aims to embed proactive, widespread adaptation in development activities and to advance adaptive livelihoods for vulnerable groups in drylands by building capacity and closing knowledge gaps. The project is being implemented in four regions (Eastern, Southern and Western Africa and South Asia). In Southern Africa, the research is focused in Onesi constituency in Omusati region in Namibia and Botswana with a focus on the Bobirwa sub-district in the Limpopo Basin. More information about the project is available on the website (<http://www.assar.uct.ac.za/>) and a short video showing ASSAR’s Theory of Change: Adapting to climate change in semi-arid Africa and Asia can be viewed here: <https://youtu.be/0sEqm7tq6D8> Enquiries: Email sheila.lashford@intasave-caribsave.org

34 MV PV capacity for Zambia

Enel, acting through its renewable energy division Enel Green Power (EGP), has been awarded the right to develop, finance, construct, own and operate a 34 MW PV (dc capacity, equal to 28 MW ac) solar project in Zambia following the Scaling Solar programme first round tender launched by the state-owned investment holding company Industrial Development Corporation Limited (IDC). Mosi-oa-Tunya, which is located in Lusaka South Multi-Facility Economic Zone in southern Zambia, marks the entry of Enel in the country's renewables market.

"This is a landmark award for EGP, underlining the consistent development of a gradually and well planned expansion in selected areas of the African continent where the company can play a key role in providing smart, efficient and sustainable energy solutions," said Francesco Venturini, Head of Enel's Global Renewable Energies division, Enel Green Power.

"Our entry into Zambia – a country offering a very attractive investment proposition – is another step forward in this respect and we are proud to contribute to the Scaling Solar programme, one of the best-designed schemes for renewables in Africa."

Enel will be investing approximately US\$ 40 M in the construction of the new PV plant, as part of the investment programme indicated by the company's current strategic plan. The project will be supported by a 25 year-long Power Purchase Agreement (PPA) for the sale of all the energy generated by the plant to the state-owned utility ZESCO.

Enquiries: Email ufficiostampa@enel.com

Environmental accreditation

IRISS is proud to announce that as part of its annual ISO 9001 review, the company has also been awarded ISO 14001 accreditation for environmental management. This environmental standard is a systematic framework to manage the immediate and long term environmental impacts of an organisation's products, services and processes.

The internationally acknowledged ISO 14001 Environmental Management System certification recognises companies that have adopted environmentally responsible practices in their business processes. In line with its sustainability strategy, IRISS strives to minimise its environmental footprint. IRISS does this by increasing its energy efficiency and continuously improves and implements measures taken to protect the environment and people when serving customers and providing agreed technical services. Martin Robinson, chief executive officer of IRISS, comments: "Achieving ISO 14001 is a major milestone and reflects the responsibility that our management has always taken to ensure that we look after our employees, our customers and our business at all times. This code of conduct captures IRISS's core values of safety, excellence, respect and commitment which are embedded within every aspect of our business."



IRISS leads globally in Electrical Maintenance Safety Devices (EMSDs) and the designer of the world's first patented industrial grade IR window solutions.

Enquiries: R&C Instrumentation, Steve Edwards. Tel. +27 (0) 32 946 2805 or email stevee@randci.co.za

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Energy innovations to bring prosperity to Africa

Roger Dixon, SRK Consulting (Africa)

Africa is on the brink of an energy revolution which will transform lives across the continent, if decision-makers can fully grasp and advance the technological and other innovations on our doorstep.

Rolling back poverty and boosting growth by getting affordable electricity to all households in Africa is now a more realistic possibility than ever before, especially with fast-developing renewable energy technologies to build upon. The developmental impact of access to electricity at household and community level is particularly important in the era of mobile and digital communication. Electricity is the first step into the digital age, facilitating improved levels of learning, enterprise, healthcare and communication. In many remote areas, electricity in the household heralds a new culture of efficiency in which people can spend time on more productive activities instead of fetching firewood or water.

Electricity makes a vital contribution to improving educational access and quality, which are in turn linked to economic performance, employment and more sustainable levels of population growth.

According to the African Development Bank (AfDB), the continent loses 4% of its gross domestic product due to lack of electricity – with over 645 million Africans living without it [1]. Electricity use per capita averages just 181 kilowatt hours (kWh) in Africa, compared to about 13 000 kWh in the US and over 6 500 kWh in Europe [2].

Electricity is often unaffordable to Africans, according to the AfDB, which estimates that a person living in northern Nigeria pays up to 80 times more per unit of energy than a resident of London or New York [3]. The urgency of this challenge is clear from the ADB's plan to spend US\$12 billion in the energy sector over

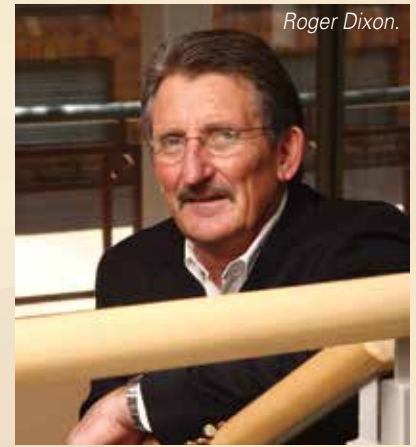
the next five years and leverage a further US\$40 - 50 billion [4]. In South Africa alone, government expenditure on energy projects – mainly from Eskom – is expected to exceed R180 billion over the next three years, making up more than 20% of public sector infrastructure spending. In addition, government is also considering potential investment in nuclear power [5].

Renewable energy sources will be a cornerstone of this economic revolution, as Africa's potential in wind, solar and hydropower is released by the quick pace of technology. The AfDB's 2015 landmark initiative – the 'New Deal on Energy for Africa' – wants to accelerate universal access to electricity in Africa by 2025; it recognises the enormous potential for renewable energy around the continent, including some 10 trillion watts (TW) potential in solar power, 350 million watts (GW) potential in hydro resources, 110 GW in wind resources and 15 GW in geothermal energy sources [6].

Through this initiative, potential will be turned into reality by boosting on-grid generation by 160 GW over the next decade through added capacity (equivalent to 800 power plants each producing 200 MW) and increasing on-grid transmission of power through 130 million new grid connections.

But we also need to innovate our models of energy generation and distribution, providing legal, policy and technical support for private sector investment and exploiting opportunities in locally-focused energy schemes alongside a national grid.

Our experience at SRK is that engineering studies must integrate closely with social and environmental requirements to ensure that projects proceed smoothly; governments must facilitate with a conducive regulatory framework and efficient permitting. One good example of how this has been accomplished recently is South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), which has grown renewable energy's share of the country's installed electricity capacity from zero to 4,5% since 2010 [7]. The programme can take most of the credit for South Africa becoming one of the world's



Roger Dixon.

top ten countries generating power from solar photo-voltaic sources, and earning the title of the largest wind-energy producer in Africa – with capacity exceeding 1 000 MW [8].

This bold initiative breaks new ground and proves that renewable energy is both affordable and well-suited for public-private partnerships in Africa. It also shows that solar and wind power offer unprecedented opportunities to reach remote areas with electricity, without necessarily being linked to a national grid.

Conclusion

The New Deal on Energy for Africa recognises the potential here too, as its targets include 75 million off-grid connections [9] supplied by substantial new generation capacity that does not feed into the main grid. The AfDB does well to remind us, however, that one of the guiding principles behind successfully implementing their plans will be raised levels of political will and action – so we hope that all African governments will heed its call.

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Panel building facility meets customer demand

In a move that underlines **Zest WEG Group's** customer-centric business philosophy, the company established a panel building facility in 2014 to cater specifically for the demand from its existing customer base in the Western Cape. Marthinus



Greeff, Zest WEG Group Cape Town branch manager, explains that in addition to providing its local customer base with access to quality products, the facility is aimed at facilitating access to technically competent products at an affordable cost.

The ISO certified panel building facility has seen phenomenal growth which can be attributed

to the quality workmanship being rendered and the fact that the panels meet all the requisite electrical standard requirements. Panels are typically used to control processes across a wide range of industries including mining, water and wastewater, irrigation, HVAC, food and beverage, fishing, engineering and heavy industrial sector.

"The type of environment where a panel will be installed is important as different industry sectors have different safety and protection requirements. An example would be mitigation against the higher levels of potential corrosion that are experienced in the petrochemical sector," says Greeff. Other factors such as voltage irregularities, which can impact on an installation, can be overcome by ensuring that appropriate protection measures are implemented.

ZestWEG Group panel solutions range from simple DOL (direct online) and Star Delta panels up to complete motor control solutions which could include PLCs, variable speed drives, soft starters and power factor correction. "An emphasis on custom built solutions that cater for the specific customer requirement is ensured by leveraging the vast experience, expertise and knowledge that our team has amassed over the years in a wide variety of contracts," adds Greeff.

Enquiries: Kirsten Larkan. Tel. +27 (0) 11 723 6000 or email marketing@zestweg.com

Selling cooling as a utility

Energy solutions provider and PSG subsidiary, **Energy Partners**, recently launched its new refrigeration product, which enables clients to purchase low cost cooling without the hassle of purchasing or maintaining a refrigeration plant. Through this agreement clients can purchase 'cooling' from Energy Partners as a utility at an agreed upon cost per cooling unit as measured by their newly developed refrigeration meter.

This is according to Dawie Kriel, Head of HVAC & Refrigeration at Energy Partners, who explains that the cost of our clients' refrigeration is calculated by adding the maintenance and energy cost and dividing the total by measured cooling consumption (kWhR).

He says that there are two different types of organisations that could potentially benefit from this service offering. "The first type of organisation is one that currently owns a refrigeration plant and wants to improve efficiency and reliability and not have the hassle of operating a plant. The second type is an organisation that is planning new facilities which will require efficient and reliable cooling for its daily operations on a 'pay as you use' basis."

Enquiries: Visit www.energypartners.co.za



Dawie Kriel, head of HVAC & Refrigeration, Energy Partners.

Bizz Buzz

GE Africa Innovation Centre

GE has officially opened the GE Africa Innovation Centre in Johannesburg South Africa. The centre, a R500 M, 2 700 m² facility, affirms that Africa and South Africa continue to be a good investment destination for big businesses, and that solutions to Africa's challenges should come from Africa. The centre is the tenth GE Innovation Centre globally and the first Innovation Centre for GE in Africa. It is the first GREEN and LEED certified GE building in sub-Saharan Africa and will be GE's Centre of Excellence (CoE) for innovation in Africa with key business sectors such as aviation, energy, healthcare, oil and gas, power and transportation and will serve as the new headquarters for GE Healthcare.

Enquiries: Tel. +27 (0) 11 237 0019 or email Thulisile.phiri@ge.com

South African distributor for welding company

D&D Industrial has been appointed as the exclusive South African distributor for Orbitalum Tools GmbH. This is a global leader in orbital tube and pipe preparation and orbital welding technology for industrial piping systems, prefabrication and maintenance. Orbitalum Tools is part of the ITW Welding Group, a global leader in welding products (Miller Electric, Hobart), TIG torches and accessories (Weld-Craft), welding consumables and gas equipment (Hobart, Elga) and automated welding equipment (Jetline). **Actum** Industrial clinched the agency via Orbital Cutting & Welding of Dubai, which represents both EH Wachs and Orbitalum. The company is looking to make inroads into the South Africa market.

Enquiries: Kevin Klaff. Email kevin@actum.co.za

Simplified data protection comes to Africa

Networks Unlimited, South African value-added distributor of converged technology, data centre, networking, and security technology solutions, has been named as sole distributor of Rubrik converged data management solutions in Africa. Under the agreement, Networks Unlimited will distribute Rubrik's Converged Data Management platform, which delivers web-scale automated back-up, instant recovery, unlimited replication, and data archival. "The agreement allows us to add a focused data back-up solution to our current family of products, strengthening Networks Unlimited's offering in the market," says Anton Jacobsz, Networks Unlimited managing director.

Enquiries: Evalean Moonsamy. Email evalean.moonsamy@nu.co.za

Reliable level detection in hazardous areas

LMT sensors reliably detect levels in storage tanks in explosive areas. They can be used in zones 2 and 22. The sensor with its high-quality housing materials such as high-grade stainless steel (316L/1.4404) and PEEK meets all requirements for hygienic areas. This includes approvals such as EHEDG and FDA.

Available from **ifm electronic**, the LMT can be adjusted to almost all liquid and viscous media

as well as powders. The distinction between two media in the same application is possible due to the two switching outputs which can be set independently. Convenient parameter setting is made via IO-Link. Applications for these sensors include liquids, viscous media and powders.

Enquiries: Alwyn Skelton. Tel: +27 12 450 0400 or email info.za@ifm.com



Launch of best-in-class robots

South Africa is one of 39 countries globally to benefit from Omron's worldwide launch of 49 new best-in-class robots in April 2016. The robots are integrated with Omron's family of sensors, safety components and award-winning NX/NJ series machine automation controllers to simplify the implementation of robots in a production environment.

These flexible and agile new solutions are ideally-suited to the local food and beverage, automotive and high technology industries. Evert Janse Van Vuuren elaborates: "The programming software used for the Adept Robots. 'Adept Ace' has an integrated set-up wizard, guiding the user through the configuration setup, allowing fast, easy and user friendly configuration for pick and place sequences for many of the application scenarios pertaining to the South African market, including pick and place applications from stationary platforms, belt camera part picking, fixed camera part picking and static pick and place applications. In many applications relating to pick and place, with or without camera or belt tracking, no complex coding is necessary, due to the setup wizard automatic code generator."

A major benefit of this launch is that it provides industrial robot models achieving both high-speed performance and reliability. The release of the three robot families – SCARA, Delta and Articulated – bring both high-speed performance and reliability to the mechanical side of the **Omron** solution. All the robots can be controlled by a common integrated development environment which enables flexible use of robot types in line with required applications.

It also enables comprehensive linkage with control products, such as PLCs, as Omron industrial robot solutions seamlessly link all robots with the machine control environment managed by the Sysmac automation platform. This improves the total throughput of the most demanding production lines, overtaking the limitations of the traditional framework that uses conventional robots.

The Automation Control Environment (ACE) contains useful application oriented wizards that significantly minimise the amount of programming code. The users have access to a powerful 3D emulation tool that significantly reduces the time to validate new automated processes. Vision guided robotics applications are completely supported by the ACE PackXpert for packaging lines.

Enquiries: Omron Electronics. Tel. +27 (0) 11 579 2600 or email info.sa@eu.omron.com



Affordable off-the-shelf premium quality products

World Power Products, the 100% South African-owned manufacturer, is a specialist fabricator of high-precision sheet metal products for over 50 years and boasts extensive design, fabrication and finishing facilities at its Johannesburg south headquarters. High-precision, custom-designed sheet metal products account for 70% of production with the balance focused on standard off-the-shelf mild steel and stainless steel cabinets, enclosures, storage systems, locks and hinges as well as perforated sheets manufactured for local and international electrical, electronic, telecommunications and IT equipment industries. All products are manufactured from original, innovative and unique in-house designs which are highly adaptable to offer customers and end users maximum versatility.

"The fact that our 'home-grown' products are available from an on-demand store presents customers and end-users with advantages such as immediate

availability, no lead times and little downtime. Buying direct from the manufacturer also holds a distinct price advantage," says World Power Products Managing Director, Jan Görtzen. The company's off-the shelf product line-up includes the PB series of modular industrial cabinets and enclosures. The industrial cabinets are ideally suited for a wide range of electrical, electronic and telecommunications applications. The robust PB 3000 floor standing mount cabinets are designed to house 19" equipment, electronic modules and data modems.

The company also produces compact, modular, space-saving, Storage Systems for tools and equipment. World Power Products is the only South African manufacturer to produce and sell its own line of locks and hinges under the in-house brand name Perano.

Enquiries: Samantha Hedley. Tel. +27 (0) 11 680 5524 or email shedley@wpp.co.za



From zero to two million electromagnetic flowmeters

Since 1977, Endress+Hauser has produced over two million electromagnetic flowmeters. That is more than any other flow manufacturer. "This magic number stands for high-quality measuring technology and, above all, satisfied customers in all industries," says Bernd-Josef Schäfer, Managing Director of **Endress+Hauser Flowtec AG**, the centre of competence for flow measuring technology. The company's success as a manufacturer of electromagnetic flowmeters began mid-1970s. In order to enter the water and wastewater market which was emerging at that time, Endress+Hauser purchased the company Flowtec in Bern in 1977 and moved it to a new location in Reinach (Basel-Landschaft, Switzerland). This is where Endress+Hauser started to produce flowmeters with just three employees in former military barracks.

Work was done on an on-demand basis. "Whereas today," says Bernd-Josef Schäfer, "our production spans six sites around the globe – in Switzerland, France, the USA, China, India, and Brazil – and boasts state-of-the-art logistics. This infrastructure is what has enabled us to produce two million electromagnetic flowmeters to date in accordance with required quality standards."

To put this into context: These two million electromagnetic flowmeters could measure a volume corresponding to four times the flow rate of the Amazon. Each production site also features precise calibration facilities which are regularly checked by national accreditation bodies and which guarantee consistently high measuring quality for each individual device.

Enquiries: Su-Anne Willemse. Tel. +27 (0) 011 262 8080 or email suanne.willemse@za.endress.com



Energy Training Foundation secures training facility in Pretoria

The **Energy Training Foundation (EnTF)** has its own training facility in Perseus Technopark in Lynnwood, Pretoria where all future Gauteng-based training will be hosted.

Training Manager, Izelle Bosman who has her Masters in Mechanical Engineering and holds the prestigious Association of Energy Engineers (AEE) qualifications of Certified Energy Manager (CEM), is excited about the prospects that the new facility holds to enable the strategic vision of the EnTF to be fulfilled. "Training in hotels has always been run-of-the-mill for us, but having our own facility is a privilege which we are embracing. A lot of hard work has gone into the preparations to make it the success we are aiming for," commented Bosman. The EnTF is expanding its range of training courses to include a major focus on developing candidates that are not eligible yet for AEE qualifications towards becoming skilled and market-ready so that they can achieve the distinguished status offered by the AEE. In addition, an expansion into the renewable energy training market is being pursued due to popular demand.

Enquiries: Tel. +27 (0) 41 582 2043 or email yolanda@entf.co.za



Izelle Bosman (Training Manager), Yolanda de Lange (Communications), Thomas Motheko (Training Room Administrator and Accounts) – all from Energy Training Foundation.

President Obama and Chancellor Merkel at the Hannover Trade Fair

American President, Barack Obama, and German Chancellor, Angela Merkel, visited the exhibition stand of the ifm group of companies at the recent Hannover Trade Fair. Dr. Bernd Buxbaum explained the new 3D camera systems for fast detection of 3D scenes and automatic object recognition to Chancellor Merkel and President Obama as well as to the other delegation members. During their opening tour, the President of this year's partner country, the USA, and the German Chancellor enquired about the medium-sized company's strategic orientation.

"We develop modern sensors, systems and software that communicate with each other according to the principles of Industry 4.0 and that trigger and control processes", explained Michael Marhofer, Chairman of the **ifm Group**.

Enquiries: Alwyn Skelton. Tel: +27 (0) 12 450 0400 or email info.za@ifm.com



A different take... President Barack Obama at the Hannover Trade Fair.

Energy awareness made child's play for most ages

The **Energy Awareness Game** uses home ownership as a basis for learning the fundamentals of energy saving and teaches anyone, above the age of six, energy awareness. Concepts, such as electricity metering, are depicted in a creative manner that is intuitive and easy to understand.

The game interplays 'Risk vs Reward': How to manage your risky energy expenses against the reward of more income from energy savings, and serves as a tool to promote energy awareness for all ages. Energy expenses are things like geysers, appliances, chargers, fridges, stoves, kettles, thermostats, etc. For example, to start playing you receive specified cash rentomoney notes, you do not roll a dice but read an energy saving tip with a movement number on it. The rule is you need to read the tip out loud, for all to hear, thereby embedding the information. Studies show repetition brings automatic recognition, so maybe we will now get our kids and office colleagues to 'Switch Off Something' once they've played the game! The tips vary between residential, commercial and industrial tips so there is something for everyone.

The board is divided into 24 landing spaces that consist of energy misuse blocks, where you pay a fine for over filling a kettle before boiling water, or not having a check meter for your electricity bill, to incentive blocks where you collect cash for successfully claiming an energy efficiency tax incentive, for example, and then you can purchase a house which needs to be upgraded before any cash can be collected from opponent. Upgrading the house is cleverly done in three steps, starting where you first make your house efficient by upgrading lighting and hot water heating, before a solar panel

can be purchased – the more efficient your house, the more cash you collect when an opponent lands on it.

The game also teaches financial management, and takes the player on a learning rollercoaster of excitement and interaction whilst changing the gamer's habits towards using less energy. When your money runs out, you are out of the game, so wise decision-making is required.

Enquiries: Email yolanda@entf.co.za



Order online: www.energytrainingfoundation.co.za/Game.aspx

The game costs R750 (excl VAT) and is available at a launch price of R690 (excl VAT) for the first 100 sold.

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Securex and A-OSH EXPO

The Gallagher Convention Centre in Midrand hosted Securex – an exhibition aimed at security and fire protection – together with A-OSH EXPO, an exhibition looking at occupation health and safety. The two exhibitions took place from 24 to 26 May. These events were well attended and are planned to take place from 30 May to 1 June 2017 at the same venue.

Enquiries: Email joshual@specialised.com



Shane Horn and Mary-Anne Horn, Umbani Software.



Marise Gagiano and Charl de Villiers, Phendula Technologies.



Derick Roberts and George Knoesen, TruTeq Devices.



Lelo Mokoena, Angelique Vorster, Ciara Musnitzky, Progroup.



Wade Stonehouse, Henry Stephenson and Roger Molenschot. Future Fibre Technologies.

New home for ifm ZA

On Wednesday, 20 January 2016, ifm electronic South Africa held the official opening and ribbon cutting ceremony of its brand new corporate headquarters in the capital city, Pretoria. The entire staff complement of ifm South Africa attended the event. Special guests from ifm electronic included Michael Marhofer (Chairman of ifm Group, Germany), Volker Jahns (ifm Germany), Lynn Jahns (ifm Germany) and Albert Meyer (ifm Namibia). The building is designed to allow for more efficient work flow and interaction amongst the staff and enough space for growth over the next years.

Enquiries: Alwyn Skelton. Email info.za@ifm.com



Volker Jahns (Director, ifm Germany), Michael Marhofer (Chairman of ifm Group, ifm Germany) and Alwyn Skelton (Managing Director, ifm ZA).

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Enquiries: Professor Nico Beute. CPUT. Email icue@cput.ac.za

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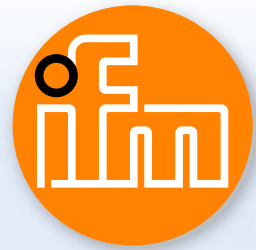
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