Simple to implement industrial condition monitoring
Improve maintenance by accessing critical asset information at the right time.

Our Plant Asset Management solutions supports you in optimising the management of your field devices from the engineering to the operation phase while reducing capital and operating expenditures. Through W@M Enterprise, Endress+Hauser’s software for asset information management, you get real-time data allowing monitoring of your process and ensuring proactive maintenance of your devices throughout the lifecycle.

To learn more about our plant asset management solutions
Contact us:
Email: info.za.sc@endress.com
Tel: +27 11 262 8000
Web: www.endress.com
Our cover

Condition monitoring systems are used for condition-based maintenance of machines and installations. Vibration sensors detect damage to rolling element bearings and gears or unbalance in drives and rotating machine parts. For more on the ifm electronic range of condition monitoring solutions, see this year’s cover story on page 4.

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Maintenance is the new cool

The IIoT makes it all doable

The objective is to keep the plant running at maximum efficiency, but now secure in the knowledge that a breakdown is not about to catch you unawares. The enablers are the methods of continuous data harvesting, followed by factual analysis performed against a known ‘healthy’ digital signature of that equipment. Any significant difference triggers an early warning of deterioration, leaving ample time to switch over to a standby – fan for arguments sake – while the primary is taken out of service for repair.

The profitability of asset-intensive manufacturing companies hinges to a large degree on maximum plant availability with minimal (zero) unplanned downtime. Even though the ideas of equipment condition monitoring have been around for years, they were always limited by the need for plant-based specialists to analyse the data and detect the warning signs. Now, thanks to affordable smart sensors and cloud-based analytical software packages, seamlessly connected via the Industrial Internet of Things, equipment analysis has become easier with many suppliers offering to monitor their machinery remotely as a service. Some even offer to monitor overall plant performance providing regular reports and recommendations, along with guarantees of maximised productivity and reduced operating expenses.

Whatever the unique requirements of your plant, we trust the extensive list of suppliers and service providers included at the back of this publication will help you to identify the right partner for an EAM strategy that moves your maintenance department from obscurity to the status of primary organisational profit driver. Preventative maintenance has been replaced by more elegant predictive techniques, and the artisan’s toolbox, while still in evidence, is now complemented by a host of augmented and virtual reality assistants, running on mobile devices, or even a pair of ‘Google-style’ safety goggles.

Over the last few years, the scope and vision of the old maintenance department has expanded from retroactive equipment repair to proactive enterprise asset management (EAM). The trend in EAM is to deploy equipment-based sensors that send machine data to edge or cloud-based analytical programs, seamlessly connected via the Industrial Internet of Things, equipment analysis has become easier with many suppliers offering to monitor their machinery remotely as a service. Some even offer to monitor overall plant performance providing regular reports and recommendations, along with guarantees of maximised productivity and reduced operating expenses.

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Most encouraging of all though is that maintenance just got a digital makeover that is bound to lift its profile and attract some of those app-hungry engineers of the smartphone generation. The tools are simply too cool to ignore.

Steven
Editor: SA Instrumentation & Control
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Entry to high-end measurement technology: precise, fast, robust

**ELM3x0x basic line**
- 24 bit
- 50 kSps per channel
- simultaneous
- 25 or 100 ppm @ 23 °C

**ELM3x4x economy line**
- 24 bit
- 1 kSps per channel
- multiplexed
- 100 ppm @ 0...50 °C

Beckhoff extends the range of system-integrated and highly scalable measurement technology with the EtherCAT measurement modules from the ELM basic and economy line. The ELM314x economy line supplements the basic line by the 1 kSps sample class with low channel costs.

**Basic line**
- Input wiring: voltage 20 mV ... 60 V, current 20 mA, IEPE, DMS, RTD/TC

**Economy line**
- Input wiring: voltage 1.25 ... 10 V, current 20 mA

Each has:
- extensive variable filter functions
- TrueRMS calculation and differentiator/integrator
- standard EtherCAT interface for operation on any EtherCAT Master

www.beckhoff.co.za/measurement-technology

Beckhoff Automation (Pty) Ltd
Randburg 2169, South Africa
Phone: +27 (0)11 795 2898
info@beckhoff.co.za

New Automation Technology
Condition monitoring systems from ifm

Condition monitoring systems are used for condition-based maintenance of machines and installations. They help to detect machine damage in good time and prevent costly consequential damage. The ifm product range comprises systems for monitoring vibration, oil quality, compressed air and water consumption. Vibration sensors detect damage to rolling element bearings and gears or unbalance in drives and rotating machine parts. Systems for oil quality monitoring assist in the early detection of water and abrasion particles in hydraulic liquids and lubricants to prevent operational disturbances or damage to hydraulic power units, pumps, valves, cylinders and machines.

The new VVB sensor with IO-Link – simple to implement industrial condition monitoring
• Effective, on-line condition monitoring for simple machinery.
• Seamless integration directly into Industrial Ethernet systems.
• Simple real-time indicators for automated alerts.
• Improved performance thanks to IO-Link.
• Raw signal capture for advanced analytics.
• No control cabinet or extensive wiring required thanks to IO-Link.

Real-time maintenance for industrial machines
Industrial grade machine protection integrates directly into your existing control platform. Machine condition is continually monitored for common fault conditions of impacts, component fatigue, and friction. This allows the timely and predictable scheduling of maintenance before major damage or failure and production downtime. Machines are continuously and permanently protected unlike intermittent monitoring systems.

Easy connection thanks to IO-Link
The industrial proven IO-Link system simplifies integrating Industry 4.0 technology directly into existing control platforms. Expensive secondary networks, gateways, and IT support is not needed. IO-Link masters send status signals to the controls and have the ability to send calculated and raw vibration signals to higher-level systems for advanced analytics.

Process values
The vibration sensor VVB0xx internally acquires and analyses various process values that are used to detect machine errors:
• v-RMS (machine looseness conditions): effective value of the vibration velocity, identifies component fatigue.
• a-RMS (machine friction conditions): effective value of the acceleration, identifies mechanical rubbing.
• a-Peak (machine impact conditions): maximum acceleration, identifies mechanical impacts.
• Crest-factor: a-Peak/a-RMS, is one of the important measures of overall machine condition.

Temperature
Identifies a rising temperature caused by excessive friction or other effects (e.g. electrical causes, lubrication problems, etc.).

Raw data
The sensor also provides raw data recording of the acceleration time waveform for detailed analysis or cause analysis in case of damage. These are issued on request as a BLOB (Binary Large Object) and transmitted using IO-Link. The system can record the operating condition at 4 second intervals and transmit the data during several minutes to higher-level systems.

Online condition monitoring with fieldbus interface
The VSE15x from ifm electronic is a 6-channel diagnostic system designed to evaluate 4 dynamic signal inputs (e.g. accelerometer or analogue signals) and 2 analogue inputs (e.g. digital
or analogue signals. The VSE15x family provides different fieldbus interfaces to exchange data with a PLC. This makes it possible to display the measuring values directly on the control system and optimally adapt the monitoring functions to the operating states and processes of the machine. In addition to the fieldbus, two fast digital switching, hardwired outputs are provided for time-critical alarms, one of which can be configured for an analogue output (for example a display).

Programming and analytical software
The VES004 software is an easy-to-use, free downloadable software used to program the VSEs, collect historical data, view and record live spectrum and time waveform data and also allows sharing of configuration and data files with colleagues.

Key process values
• Frequency domain: easy adjustable monitoring of frequency specific or overall vibration values.
• Time domain: easy adjustable monitoring of time related events for fast reaction (e.g. crash detection).
• Other: easy setup for monitoring objects such as gear mesh frequency, misalignment, etc.

Reduced network complexity saves time and money
The direct PLC connection via fieldbus allows auxiliary parameters (e.g. rotational speed and triggers for operating states), as well as non-critical alarms from condition monitoring to be exchanged over the bus. This not only reduces wiring complexity but also saves the cost of providing the corresponding inputs/outputs on the PLC.

Machines with varying processes, such as machine tools, have high demands on condition monitoring systems. To recognise deterioration in quality at an early stage and avoid scrap, or even damage, a process-dependent detection of even the smallest change is necessary. This can ideally only be achieved by interlinking the operating parameters (e.g. rotational speed, power consumption, feed rate, tool, etc.) and the vibration data into the PLC. This combination of control and condition monitoring data enables process-dependent monitoring, leading to a considerable increase in quality and process reliability. The same applies to diagnosis (rolling-element bearing condition, ball screw, unbalance, gear mesh problems, etc.), where, in many cases, a high degree of diagnostic validity can only achieved by combining the vibration monitoring data with the machine/process parameters of the PLC.

Influencing process factors must be minimised and the measured data evaluated systematically. Here, too, integrating condition monitoring with the PLC is an enormous advantage and a direct fieldbus connection provides the optimal solution.

Rapid response protects machinery
If machine protection is part of the monitoring concept, a fast response is critical to minimise potential damage. For time-critical alarms, the diagnostic electronics provide two additional digital outputs with a response time of 1 ms, which can be used to initiate an immediate machine stop to minimise, or even completely avoid, consequential damage.

Conclusion
The ongoing wear of machine parts cannot be prevented. However, ifm electronics’ permanent vibration monitoring and diagnostic solutions use the technologies of Industry 4.0 to ensure that such degradation is reliably detected in time. Predictive maintenance can then be scheduled and expensive plant downtime prevented with comparably little investment, which in the end has positive effects on energy efficiency, overall equipment effectiveness and product quality assurance.

For more information contact ifm - South Africa, 0861 436 772, info.za@ifm.com, www.ifm.com
Data and digital technologies power new trends in asset management

By Ed O’Brien, research director, ARC Advisory Group.

With the pace of change accelerating in today’s industrial organisations, the expectations for the plant maintenance and operations departments continue to grow as well. This change is advancing in lockstep with the underlying equipment that must be more productive, efficient, and reliable than ever before.

The heightened expectation for asset management solutions brings focus to the primary trends driving changes in the overall enterprise asset management (EAM) market. With technological and product changes across the enterprise fundamentally changing EAM, users in today’s industrial organisations now have new tools to better assess how they monitor, maintain, and manage their assets.

**Actionable, real-time information**

These are both challenging and exciting times for maintenance and operations users in industrial organisations looking to find actionable information in a sea of disparate data. With a wide variety of data sources available today, finding the right information, at the right time and, ideally, in the right context, is more important than ever. This is why we’re seeing an increasing demand for updated EAM systems and why these systems are needed to support more effective asset lifecycle management (ALM) and asset performance management (APM). Today’s enlightened professionals need to look beyond the standard reports based on static, historical data in month-end printouts, since these are insufficient in today’s fast-paced maintenance environments.

Maintenance information today increasingly requires visibility into predictive information, forecasts, and projections for preventive and other planned and recommended work. The availability of tools such as data analytics, data visualisation, and predictive analytics to augment EAM and PdM initiatives can provide organisations with a strong competitive differentiator. This is particularly true in maintenance and operations functions, as there is an ongoing challenge to make sense of disparate data. Personnel in these departments often desperately seek ways to extract nuggets of relevant and useful information in a timely (real-time or near-real-time) manner.

Furthermore, because many organisations have traditionally considered analytics to be under the umbrella of dedicated quant staffs, they are often reluctant to undertake analytics initiatives at the business unit level, including maintenance teams. This is driven by the perception that analytics capabilities are only available to those in large organisations that have access to costly analytics solutions and trained data scientists and statisticians assigned to organisations’ quant staffs. This perception is beginning to change, however, as there has been an increase recently in ‘self-service’ style analytics tools that can be used by more plant personnel. These solutions can allow an expanded array of users – and particularly maintenance users – to begin to leverage the power of analytics.

The underlying purpose of many EAM systems has grown from more basic work request, work order, and inventory management information to an expanded role in asset lifecycle management, including the financial implications of managing equipment, personnel, and other resources in asset-intensive industries. Looking ahead, EAM’s role as a foundation for capturing and managing industrial IoT, ERP, and similar information that permeates today’s industrial organisations. Included are IoT-enabled monitoring, assessments, and data sharing across maintenance and operations functions, and increased real-time information into equipment availability, performance, trends, and the condition of individual components throughout asset hierarchies.

EAM’s extended reach is largely driven by the movement from siloed, monolithic, and proprietary systems to cross-organisational, interconnected, and open enterprise systems that can be used throughout maintenance and operations organisations.

**Rising expectations for asset management**

Expectations for asset management capabilities, often led by EAM systems, are increasing. These are driven largely by new requirements to support digital transformation initiatives. The result is a need for greater connectivity, visibility, and information-sharing both within and outside of enterprises.

New and expanded features can range from broadening traditional work management planning, scheduling, and execution capabilities; to industry-specific functionality and spare parts inventory management. These capabilities are enhanced by expanded connectivity and visibility to help users make better, more informed, and more timely decisions about preventive and corrective maintenance. In addition, many organisations are already using or at least considering on-premise, SaaS, or hybrid business models.

The implications are significant, as many organisations are reviewing their current EAM strategies within the context of their existing or planned digital transformation projects and initiatives. These conversations often centre on how and where these systems are deployed and accessed, the expected ROI, the cost and effort that would be required to upgrade or

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Figure 1. Evolution of EAM Systems.
replace the current system, and if integration with adjacent systems would be needed.

EAM evolves at an accelerated pace
Asset management system capabilities continue to increase, elevating the state of maintenance and operations management to new levels. Next-gen systems are moving beyond the relatively modest, reactive, and largely manual maintenance capabilities seen in previous CMMS and EAM systems. Expanded EAM capabilities are centred around broader and deeper features and extensions of features to support adjacent systems. In addition, both on-premise and SaaS deployment options are now available.

The adjacent systems include IoT-based sensor networks and condition monitoring systems, plant and enterprise historians, as well as systems intended to support both asset lifecycle management and asset performance management. For ALM, this means broader features in such areas as asset specifications, design, acquisition, and disposal.

To more fully support APM, advanced EAM solutions can include interoperability with a wide range of enterprise inputs, including IoT and edge computing, reliability-centred maintenance (RCM), predictive maintenance (PM), and predictive analytics solutions.

Further examples of the evolution of IT, OT and EAM systems can be seen in Figure 2, which shows how far the evolution of these systems has occurred over the recent past. They have evolved in many ways, but most notably in such areas as the development process, app architecture and development, and infrastructure.

Included in this transition is a movement from siloed functional solutions to seamless, real-time, enterprise-level asset management systems. These solutions can manage maintenance activities across the board. These can include horizontal solutions for plant, facilities, and field service use; vertical variants for trucking and transportation, public transportation, aviation and aerospace; and other industry-specific asset management systems.

Using EAM to identify appropriate asset management strategies
As a central repository for much asset information, expanded EAM capabilities can be particularly useful when mapping out appropriate maintenance strategies for the wide variety of possible asset types. This can help identify areas currently receiving either too little or too much maintenance.

Mining EAM data can provide a foundation for thoughtful review of recommended maintenance management strategies. For example, assets that do not affect equipment downtime or worker safety can sometimes be run-to-failure and then repaired or replaced as needed. Often, imminent failure of these non-critical assets can be identified during routine PM or other periodic inspections.

However, for assets that can impact uptime and/or safety, an increasing stringent and holistic maintenance maturity model may be warranted, including the use of condition-based, predictive, and prescriptive models.

The rise of mobility in EAM
The ubiquity of mobility and mobile devices of all kinds today drive a ‘mobile-first’ mentality that extends to EAM, often with ruggedised or even industrialised versions of smartphones, tablets, and laptops.

Increasingly, maintenance teams can plan, troubleshoot, execute, and record work via mobile devices. Nevertheless, ARC’s research indicates that almost half of EAM work orders are still handwritten by maintenance personnel, with data entry occurring afterwards by clerical personnel. The resulting output relies on often-stale information that can introduce unwanted latency into maintenance processes. The other 50 percent of technicians, however, are using computers and mobile devices for work orders and, in the future, most work requests and work orders will be managed via mobile applications and devices. These mobile systems allow technicians to assess complaint, cause, and correction options; research viable repair options needed (and parts availability); and access other needed information to increase maintenance speed and efficiency.

Unfortunately, many organisations find it difficult to identify the tangible benefits of electronic work orders. Paradoxically, this is often because they don’t have access to timely data and information.

Mobility in EAM, including handheld smart devices have grown in capability aided by technologies like GPS, GIS, and RFID. Embedded cameras, barcode and QR code

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Description</th>
<th>Asset Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescriptive</td>
<td>Model and knowledgebase identifies issues and what to do for repair. Uses multiple equipment and process data variables (multi-variate), often provided by data analytics and predictive analytics input.</td>
<td>Complex assets requiring advanced skills for problem diagnosis. May need knowledge of process dynamics.</td>
</tr>
<tr>
<td>Predictive (PM)</td>
<td>Equipment specific algorithms or deep learning. AI, and/or machine learning. Multi-variate analyses and typically uses automated data collection and predictive analytics.</td>
<td>Critical assets where unplanned downtime has significant business impact.</td>
</tr>
<tr>
<td>Condition Based (CBM)</td>
<td>Alerts for trends or other rules-based logic when condition approach upper and lower control limits. Includes inspections and manual data collection.</td>
<td>Assets with a random or unpredictable failure pattern</td>
</tr>
<tr>
<td>Preventive</td>
<td>Service in a fixed time or duty cycle interval.</td>
<td>Probability of failure increases with asset use or time</td>
</tr>
<tr>
<td>Reactive</td>
<td>Run to failure, and then repair or replace.</td>
<td>Failure is unlikely, easily fixed/replaced, or non-critical</td>
</tr>
</tbody>
</table>

Figure 2. Evolution of IT, OT, and EAM Software Systems.

Figure 3. ARC’s Maintenance Management Market Maturity Model.
ILO supports predictive and prescriptive maintenance

New capabilities made available by next-gen versions of EAM systems can be a boon for adjacent capabilities, such as in ALM and APM, condition monitoring, the IIoT, predictive maintenance, and prescriptive maintenance. The connection between EAM, IIoT and predictive maintenance continues, particularly with the ability to collect and share asset data.

Previously, predictive maintenance initiatives were often one-off, ad hoc projects that required custom consulting to manage, acquire, synchronise, and share data within the organisation. Even then, such custom efforts would typically work until changes to the system occurred (like upgrades), leaving many initiatives to break or simply ‘wither on the vine.’

With data management and industrial IoT solutions being integral parts of the latest EAM systems, today’s IIoT initiatives offer lower development costs, and fewer technology risks than in the past. These are key reasons that PdM capabilities have become easier to deploy. Looking ahead, the melding of EAM, PdM, and analytics help create a powerful force to optimise the potential for IoT in asset management. This includes new business models for how technology and third-party service providers deliver products and/or services.

AR and VR for maintenance

Some industrial organisations are using, or considering using, augmented reality (AR) and/or virtual reality (VR) to help visualise asset placement, orientation, and key components. AR and VR can be particularly valuable in areas such as inspection, maintenance, and repair.

Both technologies can help users visualise and confirm steps recommended during maintenance and safety checks. While AR is often displayed via apps on smartphones and tablets with annotated callouts, VR is set entirely in an artificial, digital world.

The ability to view digital representations and visual drilldowns of ‘parent/child’ relationships between assets can help users diagnose and plan repairs. Likewise, the ability to link renderings or integrate to files accessible by an EAM system can provide high value. AR and VR can help smart manufacturing reach its full potential in a variety of ways. This includes enabling workers to more quickly find and understand important equipment and workflow information, enabling them to complete tasks faster and more thoroughly.

AR provides overlays of information such as asset attributes and location, operating parameters, and maintenance or workflow instructions. It’s estimated that about half of manufacturing organisations today are testing AR in various forms. This is due to the technology’s potential to significantly reduce installation and maintenance costs, improve productivity, and improve outcomes.

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A recent Harvard Business Review study explored how AR can improve worker performance. The study mentions a GE technician who wired a wind turbine’s control box without and then with the help of an AR device. Without AR, the worker reviewed the instruction manual, turned to the turbine, turned back to the instructions, etc. With AR, the technician performed the same task while guided by line-of-sight instructions overlaid via an AR headset. The result was impressive – the AR-based device improved the worker’s performance by over a third during its first use.

While primarily used in the product design and manufacturing process, VR can also be a useful tool for maintenance personnel. Being able to access as-built information can help speed up the diagnostics and repair processes. VR is often used to display as-built and digital twin information, including virtual representations of equipment from 3D CAD, visualisation, and simulation systems. Employees can use a tablet to overlay a digital mockup over images of real systems to identify faulty parts that need to be repaired or replaced.

With the deep insight the technologies can provide into maintenance and operations information, asset geolocation data, as-built specs, and potential hazards, both AR and VR can significantly improve the efficiency, effectiveness, and safety of maintenance organisations.

The age of AR and VR is clearly upon us. As more firms become aware of the potential of AR and VR to make their maintenance operations more efficient and productive, many will look to integrate these capabilities within their EAM systems to improve the overall availability and performance of their critical industrial assets.

Digital transformation extends to all areas of EAM

Clearly, the overall digital transformation of industry – enabled in part by the increasing convergence of IT (information technology), OT (operational technology), and ET (engineering technology) – now extends to all areas of EAM. New digitally enabled technologies and approaches such as advanced data analytics and visualisation, mobility, and AR/VR enable today’s industrial organisations to move from the less effective reactive and preventive maintenance approaches of the past, to far more effective predictive and even prescriptive maintenance approaches. These tools can help maintenance and operations groups work together more effectively to improve asset availability, reliability, and performance while reducing overall costs, which are the kinds of things that get the positive attention from top management.

Several sessions at the 2020 ARC Industry Forum (https://tinyurl.com/7536pm) in Orlando, Florida, focused on digital transformation in asset management. Readers can view videos of this author’s Forum presentation at (https://tINYURL.com/Quy969D). In another presentation at that same Forum session (https://tINYURL.com/V60KTMQ), Scott Bender from Flint Hill Resources explained his company’s approach.

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For the first time we bring together our core global motion control technologies in a single unifying force. Through insight, intelligence and innovation we provide solutions to meet the increasingly complex demands.
This is Parker helping to solve the world’s greatest engineering challenges.
Beyond preventive maintenance

By Tad Orstad, application engineer, Parker Hannifin.

Condition monitoring and predictive maintenance to improve efficiency and reduce costs.

The ever-changing competitive environment in today’s industrial markets is forcing owners and operators to maintain their assets in prime operating condition. Traditional monitoring of selected equipment or processes is labour intensive with parameters being monitored one at a time to record their conditions, and analyse trends. In addition to consuming valuable man-hours and creating potentially dangerous situations, traditional monitoring results can be inaccurate, thus increasing downtime and maintenance costs.

Today, the IIoT provides a means of consistently capturing, communicating and recording real-time and historic data from networks of physical objects such as process equipment and vehicles with embedded sensors, software, and network connectivity. This enables the IIoT components to collect and exchange data and allows plants to detect equipment problems and process inefficiencies sooner, resulting in efficiency improvements and a reduction in costs.

Predictive maintenance goes beyond preventive

Routine inspections, system tests, lubrication, parts replacement and keeping records of equipment deterioration are all fundamental strategies for any preventive maintenance (PM) programme. Asset managers or maintenance staff establish set schedules for PM activities with the goal of reducing unplanned downtime. During PM, the systematic replacement of deteriorating components and the identification and correction of equipment issues will prevent equipment failure. However, by itself, PM does little to reduce costs for labour and spare parts as determining the ideal time for PM is imprecise and focuses on estimates in lieu of the actual equipment condition. Oftentimes, perfectly good components are periodically replaced on a need-it-or-not basis. Furthermore, some PM activities can cause collateral damage due to human error and this only adds to downtime.

To minimise unplanned downtime beyond that achieved using PM, and further reduce parts and labour costs, condition monitoring is the cornerstone for evolving predictive maintenance (PdM) solutions. Condition monitoring to track asset/system pressure, temperature and humidity levels allows asset managers and maintenance staff to perform maintenance only when necessary. By providing real-time and historic data trends of assets and processes, the condition monitoring solution allows operators to detect and diagnose issues before they become problems.

Using smart sensor hardware and analytic software, alerts can be delivered to operators when needed. PdM with condition monitoring allows optimisation of systems and assets based on actual data rather than reacting to unexpected events.

Particularly on process-critical assets and systems, integrating a PdM strategy into an existing PM program can substantially save on parts and labour, and reduce troubleshooting time through fast and precise diagnoses that maximise asset life spans.
Analytics through Bluetooth and cloud connectivity

Wireless smart sensors coupled with a software interface that enables users to visualise data collected from the sensors provides a condition monitoring and predictive maintenance solution rooted in the IIoT. Wireless sensors avoid the cost and complexity of a wiring infrastructure, and can be easily removed for modification as is typical during expansions. Monitoring a plant’s assets for temperature, pressure, humidity, dew point, flow and current usage plays a vital role in diagnosing inconsistencies, allowing users to predict and prevent downtime.

SensoNODE Blue and SensoNODE Gold wireless sensors are small in size and easy to install. They are well-suited for robust use in harsh environments, as they are constructed using 17-4 stainless steel wetted parts (or brass with humidity sensors) in a polycarbonate housing with fluorocarbon or nitrile body seals. SensoNODE Blue sensors utilise a Bluetooth radio module that lets users connect directly to a mobile device. They are ideal for quick troubleshooting of systems as well as assisting individuals that monitor the condition of assets in a route-based scenario.

Using Bluetooth technology, SensoNODE Blue sensors transmit data to the mobile software platform installed on a user’s mobile device. This allows simple, wireless monitoring of pressure, temperature, and humidity within a 250 m range of the sensors.

SensoNODE sensors have two operating modes: Connect and Beacon. Through the mobile app, users can view, manage and record data while in range. The Connect mode is used to establish a private one-to-one session with the sensor to manage the settings. The Beacon mode allows multiple users to view data from the sensors. In both modes, users can view measurements and visualise data with multiple tools. The direct link between the sensors and the mobile app puts vital information and analytics in the palm of the hand, enabling users to optimize asset performance.

SensoNODE Gold sensors are also wireless-based nodes that work on a 900 MHz frequency band. Users have the option of pressure, temperature, current, flow, humidity, dew point and a soon-to-be-released vibration node. These sensors interface with a gateway located on the premises that collects and buffers data. The gateway enables secure connections, manages the operating status, and is the data conduit to the cloud platform, as well as pushing commands from the cloud to the sensors. The cloud platform is accessed through a secure login Internet portal. It enables users to manage sensors, set thresholds and alarms, and visualises the data gathered from their assets through easy-to-use dashboards. Also, the cloud delivers email or text alerts to users when sensor levels fall above or below user-defined thresholds. This allows detection by users anywhere in the world of unexpected condition changes before they become problems.

Enabling predictive maintenance solutions in multiple industries

SensoNODE sensors and software present new opportunities for IoT solutions in any industry where monitoring of rotary machinery and continuously run manufacturing equipment is needed, especially in applications that pose safety hazards to the user. Some type of rotary machinery is used in almost every manufacturing plant, and the moving parts can make the monitoring of these assets potentially dangerous. Such assets typically require a full shutdown for maintenance or monitoring. Uptime of continuous manufacturing processes is critical to avoiding costs associated with unplanned maintenance and lost revenue. Any single issue can halt production, causing delays in getting end products to customers. SensoNODE sensors and software monitor continuous processes and alert users when action is required to avoid potential issues and to keep operations running. As a predictive maintenance tool, they not only help to increase throughput, but also maintain high quality standards. Industries such as metal and aluminium foundries, steel plants, power generation, pulp and paper, material handling, and injection moulding present just a few of many potential applications.

Saving downtime and maintenance costs in power generation

Minimising maintenance costs and downtime is especially critical in the power generation market, given pressures to remain competitive with respect to dispatch. Assets must be well-maintained to maximise availability. Prime examples of process-critical assets in power generation are gas and steam turbines. Monitoring of multiple state conditions of asset levels allows operators to detect and diagnose problems or damage to turbines before they become issues.

Temperature

Turbines that are not well lubricated or cooled with clean oil are subject to overheating. Monitoring for drastic changes of a system’s temperature can help operators identify when filters and/or oil in the turbine may need to be replaced. Such changes can take place in a plant’s hydraulic lift oil pump, hydraulic power unit, or diverter camper controls.

Pressure

Changes in a system’s pressure can also indicate turbine issues and can happen within several sections of a plant, including hydraulic lift oil pumps, hydraulic power units, hydraulic cylinders, diverter damper controls and nitrogen generators. Increased fuel consumption and/or reduced output could be tell-tale signs of a more serious problem, such as compromized integrity of rotary components within the turbine and structural damage. Such issues can lead to displacement or damage to toothed gears, blade damage or fatigue failures, and other structural damage that will ultimately impact a system’s performance.

Humidity

Power generation equipment can operate in some very harsh conditions, including inclement weather, high winds, and constant motion. Increased humidity levels translate into excessive moisture, posing threats to a turbine’s gearbox, leading to corrosion, reduced efficiency, and ultimately breakdown. SensoNODE humidity sensors are ideally suited for monitoring ambient relative humidity over the full 0-100% range.

Humidity and pressure monitoring is also critical for a plant’s nitrogen generators to ensure that a ‘dry layup’ condition for heat recovery steam generators can be maintained. During layup of heat recovery steam generators, nitrogen from a plant’s nitrogen generator is applied to prevent the onset of corrosion in the boiler tubes. Blanketing the tubes that have been exposed to moisture with nitrogen displaces oxygen and prevents tube corrosion.

Conclusion

Accurate diagnostics are vital to maintain process-critical assets through initial commissioning, operation and refurbishment. Condition monitoring and predictive maintenance solutions rooted in the IIoT allow power plants to coordinate downtime rather than reacting to unscheduled outages, improving efficiency and lowering maintenance costs. Wireless sensors allow plants to avoid putting workers into dangerous situations and locations while preserving plant machinery.

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In an increasingly competitive market, organisations across multiple industries need to be able to take the bold steps necessary to optimise their maintenance strategies and operations. A rigorous, risk-based maintenance solution that can evaluate how cost, risk and performance should be balanced over time to deliver sustainable outcomes isn’t a choice anymore, but a necessity. Implementing Asset Performance Management (APM) 4.0 enables the transition to full risk-based maintenance for improved asset performance, increased asset reliability, reduced risk, and ultimately, maximum return on asset investments.

Innovative companies are reaping the benefits of implementing proactive maintenance strategies today. When a major dairy company implemented risk-based maintenance, the result was 30% spare parts cost reduction and a 3% increase in productivity in the first year. The investment paid for itself sevenfold on a yearly basis, and the APM implementation also initiated a systemic cultural shift as the existence of extensive data libraries enabled a company-wide culture of risk awareness, asset responsibility, and problem ownership.

The maintenance maturity pyramid and APM 4.0

When discussing APM 4.0, it is important first to consider the five levels of maintenance, the value of each approach and where they fit into a comprehensive maintenance strategy.

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The maintenance maturity pyramid helps to represent the journey towards more proactive and optimised maintenance execution, all of which should be embedded in a solid asset management system based on ISO 55000. Enterprise-wide data management, risk management and mitigation form the foundation for a comprehensive APM strategy.

At the bottom of the maintenance maturity pyramid is the most basic approach, reactive maintenance. Reactive maintenance involves letting an asset run until it fails, then repairing or replacing it. This is suitable for non-critical assets that have little to no immediate impact on safety or plant availability and have minimal repair or replacement costs. However, the drawbacks of reactive maintenance are clear, as it is completely unsuitable for high-cost or mission-critical assets.

The next level of maintenance maturity is preventive maintenance, which is regularly scheduled maintenance implemented in hopes that an asset will not reach the point of failure. Preventative maintenance involves letting an asset run until it fails, then repairing or replacing it. This is suitable for non-critical assets that have little to no immediate impact on safety or plant availability and have minimal repair or replacement costs. However, the drawbacks of reactive maintenance are clear, as it is completely unsuitable for high-cost or mission-critical assets.

The condition is typically defined using rule-based logic, where the rule does not change depending on loading, ambient or operational conditions. If the condition is met, work orders can be automatically generated to help mitigate risk and proactively resolve potential problems.

For more complex and critical assets, a predictive strategy is appropriate. Using predictive maintenance (PdM), organisations can move from asking “Why did that happen?” to “What will happen?” Predictive maintenance solutions learn an asset’s unique operating profile during all loading, ambient and operational process conditions. Existing sensor data is compared to real-time operating data using advanced analytical modelling techniques to determine and alert upon subtle deviations from expected behaviour. Once an issue is identified, root cause analysis and fault diagnostics help the user to determine the significance of the problem and the resulting course of action. These early warning notifications enable users to address issues before they become problems that significantly impact operations.
“Implementing risk-based maintenance delivers numerous benefits for organisations. First, getting the most out of your existing production assets is a key success factor in achieving business objectives.”

At the very top of the maintenance maturity pyramid, the implementation of risk-based maintenance involves a comprehensive maintenance strategy that leverages existing data, advanced analytics and simulations and forecasts to understand the true issues driving asset performance and reliability. By implementing risk-based maintenance, organisations can move beyond preventing failure, and towards optimising future performance – from “What will happen?” to “What should we do?” This moves the asset from a cost centre to a major driver of profitability for the business.

Risk-based maintenance
Implementing risk-based maintenance delivers numerous benefits for organisations. First, getting the most out of your existing production assets is a key success factor in achieving business objectives. Risk-based solutions allow companies to prioritise asset management by focusing on the assets that need attention. Advanced asset criticality analysis ensures the most important assets receive priority and more rigorous analysis for optimal maintenance. When asset failures occur, root cause analysis enables users to diagnose the cause and act to eliminate reoccurring incidents. Inventory management quantifies the effect of spare parts to optimise asset management levels.

The second key benefit of risk-based maintenance is strategic. By practicing a future-focused, risk-based asset management strategy, users can perform detailed analysis and simulations to visualise the effects of deploying different asset management strategies, and ultimately, achieve short-term efficiencies and long-term sustainability. In-depth risk analysis provides detailed insight into the real factors driving asset reliability and performance, facilitating long-term planning. Extensive simulation capabilities allow users to see the impact of differing asset management approaches, enabling an aligned strategic approach to operations and asset management.

How we allocate resources efficiently and fairly between competing short and long-term (commercial, social, environmental) interests is one of the largest pain points of asset-intensive industries. Therefore, it is important to consider the role and impact of accurate financial forecasts, as unexpected shifts in capex and opex budgets can derail even the most well-laid asset management plans. Advanced risk-based maintenance tools allow users from different business units to design, simulate, measure and optimise capex and opex assessment plans, ensuring that asset management plans accurately reflect the likely financial future. Risk-based maintenance technologies can provide quick time to value – a solution with an extensive library of readily available reliability data can speed up deployment time by up to 90%.

Providing closed-loop optimisation
A comprehensive APM solution enables an APM 4.0 approach by ensuring that maintenance strategies are deployed in the most efficient and effective manner possible. APM solutions manage the collection of data from any number of sources, incorporate advanced analytics technology that combine rules-based logic and machine learning, and can trigger actions in the work order system to manage asset lifecycle and maintenance processes. These solutions help maintenance teams, systems engineers, controllers and many others take advantage of the massive amounts of data available today and use it to answer questions and make real-time decisions to maximise asset reliability and performance.

Using APM, engineers can identify and predict asset failures early, so personnel can spend less time sifting through raw data and more time resolving issues. Integration with advanced workflows facilitates the continuous improvement process, constantly driving improved operational excellence. An open-ended and hardware-agnostic solution enables easy integration with existing systems.

On the front end of an APM implementation, conducting an APM assessment can be an invaluable tool in getting started. A good APM assessment will evaluate all facets of a company’s asset management strategy, including the business context, to determine potential areas of improvement. Experienced consultants will distill these findings into a thorough action plan, providing an ideal guide for companies looking to take the first step.

Conclusion
Asset intensive industries are under continuous pressure to improve the operations of their assets while maintaining regulatory compliance. Leveraging new technologies such as cloud, big data management, machine learning and analytics can drastically improve the enterprise’s ability to plan, forecast and optimise maintenance strategies to improve asset performance management.

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Abb launches Ability Condition Monitoring for measurement devices

The ABB Ability Condition Monitoring for measurement devices is an innovative, digital solution that will keep continuous gas analysers under control to ensure clean air operations. The ground-breaking, first-to-market solution was launched in April at Hannover Messe 2020.

The new digital solution keeps track of the health of ABB measurement devices. Performing real-time data analysis, the ABB Ability Condition Monitoring for measurement devices identifies problems fast, drawing attention to significant or undesirable changes in device conditions.

Regular health check reports provide users with recommendations based on health status, allowing on-site personnel to leverage their own expertise and enabling remote assistance from ABB when required.

“By implementing the predictive maintenance approach of ABB Ability Condition Monitoring for measurement devices, equipment can be actively monitored and managed to prevent problems from arising,” said Christine Declerck, global service manager, Measurement & Analytics. “This enables customers to make informed decisions resulting in optimised operations. Customers are facing increased emissions regulations and ABB is committed to helping them address environmental impact through solutions like these, improving energy efficiency and increasing industrial productivity.”

Predictive maintenance reduces customers’ potential safety risks and helps them avoid fines. It also lowers operating and maintenance costs due to less emergency maintenance and fewer unplanned outages. When carried out through condition monitoring it ensures the highest level of availability and reliability of equipment, reducing repairs and preventing downtime.

“ABB South Africa has several continuous emissions monitoring systems installed in the country,” adds Paulo Dasilva, local business line, Industrial Automation Measurements & Analytics. “We are excited to be able to add these digital capabilities to enhance the benefits which our customers receive through ABB Ability.”

Furthermore, condition monitoring for measurement devices allows the customer to move to a planned upgrade cycle for assets, resulting in product lifecycle extension and an increase in return on investment. The digital solution also provides a streamlined process with one supplier responsible for all equipment management and maintenance. It can be used together with ABB Ability Remote Assistance for measurement devices and dynamic QR code assistance for analysers or as a stand-alone solution.

The new digital solution is part of the ABB Advanced Services offering for measurement and analytics which is dedicated to enabling improved utilisation and performance of automation equipment, processes and personnel. Other services include ABB Ability Verification for measurement devices, and My Measurement Assistant. ABB Ability Verification for measurement devices is an extensible application that connects with field devices over their applicable protocols to provide in-situ verification. My Measurement Assistant is a web application that offers commissioning and troubleshooting checklists as well as maintenance video tutorials.

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The sub-Saharan African bearing market holds vast untapped potential and SKF South Africa is optimistic about the growth opportunities on the sub-continent. With an extensive bearing portfolio that incorporates the latest technology and premium materials and components, the global bearings and rotating technology specialist remains eager to share its knowledge and state-of-the-art solutions with customers.

“We remain committed to developing and fine tuning our bearing suite in order to remain in step with 4IR as well as our customers’ widely diverse requirements,” states Chris Lubbe, engineering manager at SKF South Africa. “Placing digitalisation at the forefront of design, we integrate a wide variety of technologies into our offerings.”

Bearings are critical components; their failure can result in other component failure, leading to costly downtime and equipment repair or replacement. Lubbe points out that with advanced technologies packed into the bearings, the importance of correct equipment care is more crucial than ever to ensure optimal machine performance, reliability, availability and extended lifespan. Alongside accurate seating, fitment and alignment, appropriate maintenance and lubrication as well as equipment monitoring are also essential. “In a nutshell, if you treat your bearings right, the entire operation, from start to finish, will run smoothly and the benefits will reflect in your bottom line,” he adds.

Condition monitoring
Customers do not always have skilled onsite employees to identify problems or run maintenance checks. Understanding the cost and time implications that all these challenges place on customers, SKF offers a wide selection of products such as auto-lubrication, dismounting and alignment tools to streamline this process.

Taking it a step further, SKF’s advanced condition monitoring systems enable customers to view their equipment’s machine health (remotely 24/7), check if units are operating correctly and detect issues such as primary bearing defects, velocity vibrations and temperature problems. Bringing together bearings (the hardware) and system monitoring performance (the software), condition monitoring systems assist customers to identify faults so that they can be timeously dealt with to prevent costly machine damage and extended operational downtime. Furthermore, this smart software allows the SKF team round-the-clock access to information presented as a detailed analysis, enabling staff to notify and guide customers to problems so that repairs can be done during planned maintenance.

Lubbe points out that as condition-based maintenance is often reserved for only the most critical assets, SKF’s Multilog IMX range brings condition monitoring to applications that would previously have been out of reach. Available in 8, 16 and 32 channels, this flexible system can be applied across a broad spectrum of applications and industries.

Closing the loop, SKF provides full customer training, from basic bearings and maintenance to vibration analysis, at its BINDT-accredited training centre in Boksburg.

Optimal equipment performance can be attributed to a number of factors e.g. world-class manufacturing, correct product selection and installation and technologically advanced online condition monitoring systems all supported by exceptional service from trained and skilled technicians. “We can say with confidence that as a single-source supplier offering a turnkey solutions portfolio, SKF holds the competitive edge in the market,” concludes Lubbe. “And for our customers and end-users, this means enhanced productivity and production leading to low total cost of ownership and sustainable profitability.”

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Schneider Electric has announced the availability of EcoStruxure Asset Advisor for electrical distribution and critical data centre assets, as part of the company’s EcoStruxure IoT-enabled system architecture and platform.

The system brings a proactive approach to IT and electrical distribution system management, combining IoT and cloud-based technologies with Schneider Electric’s expert knowledge and services to provide a predictive solution for business continuity. EcoStruxure Asset Advisor services offer the ability to anticipate and address issues before they become critical incidents, mitigating safety risks and avoiding unplanned downtime, operational losses, and expensive maintenance interventions.

**Enhanced security and reduced downtime for greater peace of mind**

EcoStruxure Asset Advisor evaluates live data from customers’ environments and applies artificial intelligence and advanced analytics to identify potential threats. This data gives customers the power of choice for critical decisions, which means they can either take action themselves or delegate authority directly to Schneider Electric’s Service Bureau to do so on their behalf.

“EcoStruxure Asset Advisor harnesses the emergence of IoT, along with breakthroughs in connectivity, sensor technology, and analytics, to create an opportunity for critical facility managers and data centre operators to move from reactive to proactive,” said Jose Lorenzo, vice president, global field services, Schneider Electric. “As a leading manufacturer of these systems, and with over 7000 field service experts globally, Schneider Electric is uniquely positioned to work with and for our customers to take action.”

EcoStruxure Asset Advisor’s key benefits include:

- Increased safety: better security of assets and personnel with early equipment failure warnings.
- Greater operational performance: reduced unscheduled downtime, increased asset life, and a consistent experience with an optimised maintenance plan.
- Financial efficiency: reduced failure risk as well as optimised ownership and maintenance costs thanks to new asset insight.
- Industry leading expertise: the Schneider Electric Service Bureau provides expert monitoring of critical devices 24/7.

**The EcoStruxure architecture**

EcoStruxure is Schneider Electric’s open, interoperable, IoT-enabled system architecture and platform designed to deliver enhanced value around safety, reliability, efficiency, sustainability, and connectivity. It leverages advancements in IoT, mobility, sensing, cloud, analytics, and cybersecurity to deliver innovation at every level, from connected products and edge control to apps, analytics and services. Schneider Electric brings over 7000 professional and field service experts to help proactively service critical equipment.

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SICK Automation’s Digital Maintenance Manager (DMM) is an efficient maintenance and service tool for analysis and process measurement systems, providing an ideal entry point to process automation 4.0.

The DMM from SICK’s Smart Service Suite is used for managing, visualising, implementing and recording the maintenance requirements of analysis and process measurement sensors and systems in process plants. It displays all the installed sensors and measurement systems in digital form and provides plant operators with up-to-date information about their current and future operating status. On this basis, the DMM automatically identifies the operational and statutory maintenance requirements and coordinates the upcoming service dates. The integrated document management system manages all the service activities carried out by internal or external staff and keeps the test documents up-to-date, which means that a full documentation set is available quickly in the event of an audit.

The DMM is a non-proprietary web front-end that can be used via a web interface from any device with an Internet connection. The service platform is compatible with all analysis and process measurement sensors and systems from SICK and offers plant operators the opportunity to manage and visualise their entire field instrumentation and to integrate it into an end-to-end maintenance and document management system. With the help of a traffic signal system, operators can immediately identify the maintenance status of sensors and measurement systems in machines and plants. This allows maintenance to be planned in advance and implemented either by in-house engineers or by SICK LifeTime Services.

Full, up-to-date documentation of maintenance history
The DMM allows operators of waste incineration plants, power stations, steel and cement works and plants and refineries in the chemical and petrochemical industries, to simplify their maintenance planning process. The platform arranges and reports on the maintenance activities agreed with SICK, with other providers, or with the in-house service team. Once the work has been completed, the accompanying service documentation is automatically created and updated. The integrated document management system enables operators to access all the relevant service reports for gas analysers, dust measuring devices, or emission monitoring systems, for example, at any time and with just a few clicks of the mouse. The entire test documentation is also easily available in the event of an audit.

Access to other maintenance services
The service platform also gives access to other LifeTime Services from SICK, if required. These include a direct remote connection via the Internet to sensors and measurement systems. The condition monitoring and predictive maintenance solution allows status figures and statistics from the field instrumentation to be analysed and evaluated directly in order to identify and prevent faults, failures and the risk of damage at an early stage. Other service modules, for example, support in relation to QAL2 and QAL3, are also available. Customers can also add function tests and annual operational checks.

Entry point to process automation 4.0
By fully digitising all analysis and process measurement systems in one plant, the system allows for comprehensive installed base management. It also paves the way for Process Automation 4.0 and, therefore, for the value-added networking of sensors and measurement systems in machines and equipment and the systematic evaluation of machine and process data in order to minimise downtimes and improve the productivity of process plants.

The DMM is compatible with all analysis and process measurement sensors and systems from SICK and offers the opportunity to manage and visualise the entire field instrumentation and to integrate it into an end-to-end maintenance and document management system.

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The mechanical engineering sector is working constantly to find ways to optimise machine availability and minimise fluctuations in production. Integrating high-performance measurement capabilities into control systems can help initiate new development approaches that overcome performance limitations once considered insurmountable. The new ELM314x Economy line of EtherCAT measurement modules opens up this path to innovation for an even broader diversity of machinery.

Programmers and engineers looking to advance machine development often run into at least one technological hurdle that stalls further performance gains. The problem areas can be many and varied – physical as well as electrical – and they broadly affect all the machines of a given type, even from multiple vendors. The key question is how machine planners can deal with these challenges. When it comes to controlling machines in a closed loop or gaining greater visibility into machine processes, the EtherCAT measurement modules from Beckhoff offer a right-fit solution by allowing high-performance measurement technology to be incorporated directly into the control systems.

Integrated measurement technology benefits machine builders and users in various ways over the entire life cycle of a test or production machine. Examples include:

- During first-time commissioning, installation troubleshooting and process fine-tuning.
- During operation, to monitor operating sequences and production quality, measure vibration, monitor power, check results and predict the need for maintenance.
- In maintenance, to verify that the work carried out has achieved the intended outcomes.
- In all these cases, measurement technology adds value by delivering insights gained from carefully planned measures to achieve greater visibility into machines’ inner workings. But for this to succeed, measurement applications must be planned in from the outset, during a machine’s conceptual design phase. After all, if there are no sensors in place to measure something, either directly or indirectly, no measurements can be made. Only users who are thoroughly familiar with a given process can make informed decisions on whereabouts it would make sense to take measurements within a machine. That said, novel types of measurements can also produce surprising new findings that allow processes to be optimised further.

The 1 ksps Economy line of EtherCAT measurement modules is the second category of integrated measurement technology to be released by Beckhoff. The basic ELM3x0x line rolled out previously, with sampling rates of 10 to 50 ksps per channel and an accuracy of 100 ppm, is designed to support highly dynamic measurements – rapid sequences of movements, load reversals or alternation of the kind that often occur on test rigs and benches. The same terminals can provide compelling insights into processes in high-speed production machines as well.

Measurement modules with diagnostic capabilities

The ability to monitor and diagnostically analyse measurement performance is of key importance for any user. This applies not just to machines operating continuously but also to test rigs that need to run over the weekend and even short-term testing tasks. Cable breakage, short circuit, overheating and disruptions to the power supply are just some of the issues which, at best, might cause an interruption of the measurement process and at worst, falsify the measurements recorded without being noticed. Measurements of the kind taken unattended, deep inside production machinery, must therefore be able to anticipate such faults from the outset and report them reliably in the event that flawless
measurement results can no longer be obtained.

The EtherCAT measurement modules from Beckhoff are designed to do just this. Self-diagnostic capabilities account for a significant proportion of the device firmware and hardware. For users, this means that they can rely on the modules to detect and report commonly occurring faults and only ever return reliable measurement readings to the control system.

Making the most of EtherCAT’s advantages
The fast, high-precision measurement modules benefit from the field-proven EtherCAT capabilities, which are ideal for industrial measurement systems:

• The transfer rate of 100 Mbit/s is sufficient for several 100 analog channels, each with a sampling rate of 10 ksps.
• The distributed clocks system, which allows synchronised data capture on a large number of channels and terminals, at long distances, with an accuracy of up to 100 ns.
• The proven, consistent parameterisation of EtherCAT slaves via CoE, and data transport via PDO is already familiar to the users.

Given that PC-based control technology has always been used to equip even extended plants with EtherCAT, the Beckhoff portfolio not only incorporates measurement terminals and the means to implement TwinCAT functionality, it also includes numerous EtherCAT infrastructure components spanning the entire measurement chain. The latter include the following: optical transmission equipment such as couplers and fibre-optic media converters for environments with a high EMC load; the CU2508 family of port multipliers for parallel EtherCAT data streams requiring transmission rates in excess of 100 Mbit/s; and couplers with ID switches to support flexible topologies and in general, the fault-tolerant redundant EtherCAT cabling.

Measurement technology and simulation
In many fields, computer-aided simulation is used to trial a wide range of ideas in advance, thus reducing subsequent testing time, effort and expense. It can be highly worthwhile, especially with the kinds of complex systems that cannot be tested extensively in advance. With systems like these, simulation may be the only viable way to find the right approach to a solution. It can also help to identify the best locations for sensors within a machine, or, alternatively, show that certain sensors could be left out if the information they would provide can be obtained by other, possibly indirect, means.

This might sound as if measurement technology could become redundant in the long term. Doubtless, simulations can be run under a wide range of repeatedly changed starting conditions and can save a lot of time. However, the fact remains that applications must always be tested, time and again, against real-life conditions as well. A simulation model has to be compared repeatedly with how the actual machine it represents behaves. Precise measurement data obtained from the machine itself showing actual timings and quantities is essential. Without this feedback, the model would evolve in isolation, and any simulations run would produce unrealistic results. High-quality, built-in measuring technology ensures a steady flow of information from the machines, while the various measurement channels, if set correctly, provide exactly the control data needed to refine the simulation model.

High-quality measurement data is also crucial in another, entirely different field of application where a virtual world and real-world data are combined: hardware-in-the-loop testing. Here, tests and measurements are conducted on a device, and the data collected is fed back into a test model in real time. If incorrect measurements, dynamic inaccuracies or deviations occur, testing is no longer possible. HIL tests of this kind are now performed on many production machines and this calls for measurements to be conducted under production conditions, with short cycle times. These are genuine high-speed measurement tasks where precision is essential and Beckhoff increasingly is equipping test benches with EtherCAT measurement modules for this very purpose.

Conclusion
Looking ahead, the emphasis placed on equipping various types of machines with measurement technology may shift as machine vision systems and advances in sensor technology give rise to new solutions for new requirements. However, continuous measurement in some form will always remain part of the process. Beckhoff, with its EtherCAT measurement modules in general and the new ELM314x Economy line in particular, has successfully introduced a valuable class of component to electrical measurement technology that serves this purpose well. With the addition of machine vision technology to TwinCAT, optical measurement is becoming increasingly important, too and Beckhoff will continue to rank as an important equipment supplier for advanced and sophisticated machinery, helping to future-proof not just production machines, but end-customers’ processes as well.

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Leading African oil condition monitoring company, WearCheck, has been in business for over 40 years and offers a complete condition monitoring solution hub for boosting machine reliability and availability. The company specialises in condition monitoring solutions and the scientific analysis of used oil and other fluids from mechanical and electrical systems. WearCheck specialises in boosting the availability and reliability of components, thereby helping its customers to operate more efficiently and save money on maintenance in industries such as mining, earthmoving, transport, shipping, industrial, aircraft and power generation.

Advanced services
Alongside the traditional fluid analysis services, customers also have access to reliability solutions (RS) services, transformer chemistry services (TCS) and advanced field services (AFS).

The RS team specialises in thermal imaging, vibration analysis, laser alignment, balancing, operational deflection shape (ODS), structural resonance, ultrasonic services and many other specialist techniques that keep machinery operating at optimum levels while boosting its lifespan.

The TCS team specialises in the monitoring of transformer condition to reduce the risk of unexpected downtime. WearCheck offers the usual transformer oil quality analysis (colour, visual, dielectric breakdown voltage, water content, interfacial tension, acidity, power factor and specific gravity) and to meet the growing need for additional specialist transformer tests, it conducts diagnostic testing including dissolved gas analysis, furanic compounds, metals-in-oil, paper quality testing and tap changer/diverter diagnosis.

The key functions of AFS is to create a secure safety environment for both man and machine and also to reduce operational risks. WearCheck’s highly-skilled and experienced inspectors are on call 24/7/365 to help customers to identify underlying defects and mitigating these risks on critical equipment. The advanced field services are:

- **Non-destructive testing (NDT)** – techniques to test the integrity of a component or system without damaging it.
- **Technical compliance (TC)** – expert guidance to assist companies with regulatory requirements, highlighting unacceptable conditions and reticulation equipment compliance during audits.
- **Rope condition assessment (RCA)** – inspecting the integrity of steel rope cables, as per OEM or international standards.

Non-destructive testing includes a variety of techniques through which the properties and condition of a component or system are evaluated without causing any permanent damage to it – critical component assessments, machine condition assessments and inspection of ancillary equipment, including main vent fans, compressors, mills, pumps and conveyors.

The TC division gives expert advice to help companies comply with regulatory requirements. Compliance promotes operational and technical excellence through risk identification and corrective action implementation. WearCheck’s specialist compliance techniques assist many industries,
among them geological, metallurgical, accounting and laboratory reviews, international and group technical standards compliance, certified reference material, density determination techniques and quality management systems.

The TC team provides specialist audits on hoisting systems, shaft decelerometer testing, winder level and dynamic break testing, as well as vertical shaft guide alignment. Auditing services encompass AerView, AerView II, Locked Bell, ventilation fan electrical audits and machinery compliance audits.

The rope condition assessment team conducts testing to determine the integrity of steel rope cables as stipulated in the SANS 10293:1996 Code of Practice for Steel Wire Ropes. WearCheck’s highly-qualified inspectors are all certified to South African Qualification and Certification Committee (SAQCC) level II.

Non-destructive rope inspections improve safety where steel wire ropes play a safety-critical role, where regular RCA is a legal requirement. Examples include mine winders, chairlifts, incline winders, shaft rope guides, elevators, flare/slack stay ropes, as well as stacker/reclaimers and belt wagons. Some of WearCheck’s better-known customers include Cape Town’s Table Mountain aerial cableway and Namdeb – a shallow-water inshore diamond mine in Namibia. Rope manufacturers rely on RCA as a means of ensuring compliance with quality specifications during the quality assessment process in the production of new ropes.

World-class laboratories
WearCheck has 17 world-class laboratories across nine countries in Africa and beyond and a host of support offices around the continent. The RSA laboratories are in Johannesburg, Cape Town, Durban and Middelburg, with support offices in Bloemfontein, Rustenburg, Steelpoort, Port Elizabeth and Khatu. International laboratories include Mozambique, Ghana, Zimbabwe, DRC, Namibia, India, Dubai and Zambia.

A source of pride for WearCheck is the fact that the company is the only oil analysis operation in Africa with an ISO 9001 quality certification, an ISO 14001 certification for its environmental management programme and an ISO 17025 accreditation for its laboratory centric quality management programme. The company is currently working on ISO 45001 certification for health and safety management.

Dedicated, ongoing investment in new technology and staff training ensures that all equipment in WearCheck’s laboratories is state-of-the-art and employees are highly skilled. Laboratories are largely automated and integrated with the latest information technology. Research and development play a major role in the company’s continuous commitment to improving systems. The condition monitoring app makes the company’s expertise available at all times, while an unswerving commitment to ethical operations and accuracy ensures that all operational areas are managed to standards that ensure products and services comply with strict international standards.

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BMG filtration solutions offer reliable contamination control

BMG’s Fluid Technology division is committed to improving operational efficiencies for customers in all industries by providing essential filtration, separation and purification technologies.

“With broad technical capabilities and an extensive range of quality-branded fluid power components, BMG is able to offer total process, filtration and lubrication management solutions, even in chemical and corrosive environments, as well as in arduous mining conditions, throughout Africa,” says Willie Lamprecht, BMG’s business unit manager, Fluid Technology Low Pressure. “BMG’s Fluid Technology team has a thorough understanding of the filtration process and offers solutions to ensure fluids – including oil, fuel and lubricant oil – are within the required cleanliness standards.

“Efficient filtration disciplines result in optimum performance, improved reliability and extended service life of machinery, equipment and vehicles. Without a structured control and contamination prevention programme, premature equipment failure is likely to occur, resulting in unnecessary downtime and costly replacement of parts.”

Increased efficiency
Optimum filtration performance, combined with lower differential pressure of the system, significantly reduces energy consumption, which is critical to maximising production efficiencies. BMG’s fluid technology services include solutions for fuel and industrial filtration systems, hydraulics and pneumatics, lubrication, hydraulic hose and fittings, as well as instrumentation, pumps and industrial valves.

The range encompasses FG EcoPart filter elements for stationary and mobile hydraulic systems from the Filtration Group. These components, with defined filter performance and purity class, comply with stringent DIN and ISO standards and have all other necessary standard industry approvals.

FG EcoPart series, which includes a wide range of pressure filter and return filter elements, is available from BMG in different versions, with various grades of fineness. These components are suitable for diverse hydraulic applications, as well as gear oil treatment. FG Filter elements are designed to reduce the solid particle contamination to the prescribed contamination class, to prevent the ingress of dirt from the environment and maintain the properties of hydraulics fluids for an extended time period.

Included in this range are FG desiccant breathers, which protect lubricants and machines from the damage caused by moisture and the ingress of particles.

The FG breather replaces conventional dust caps or breathers often found on new equipment. When contaminated air enters the top of the breather, it passes through layered filter media, blocking particles from entering the breather, thus preventing wear to equipment surfaces.

The filtered air passes through a bed of silica gel, which effectively removes moisture. Silica keeps the equipment dry by attracting moisture from inside the equipment reservoir through service or shut-down.

FG desiccant breathers have an enlarged housing, which ensures up to 20% more absorption of moisture than conventional breathers. The centre tube is constructed from a robust nylon material, providing rigidity to the element and allowing an even air flow through the silica gel. For additional system protection, secondary filter media prevent any possible migration of silica dust.

For optimum change-out intervals, a clear polycarbonate outer shell provides a visual indicator of the condition of silica gel. Multi-layer polyester filter media provide 3-micron particle filtration, while polyurethane foam collects oil mist and distributes air evenly over filter media and the moisture-absorbing silica gel.

Breathers are suitable for use in hydraulic units, where there are high humidity and temperature fluctuations. The normal hazards of condensation – rapid ageing of hydraulic oil, degradation of additives and corrosion – are prevented.

Typical applications include wind energy, power plants, tunnel construction, aerospace and manufacturing processes, as well as petrochemical and chemical plants.

In addition, BMG supplies FG coalescer filters, which are used in the fuel line for the efficient operation of marine diesel engines, as well as air breather filters with housings made of non-corrosive material for high efficiency and extended service life. Low pressure filters for modern hydraulic systems are fitted with glass fibre PS filter elements, with high differential pressure stability and dirt holding capacity. These modular low pressure filters ensure a minimal pressure drop through the optimal flow design.

BMG’s national branch network supports an extensive range of fluid technology products and bespoke systems, with field services and technical resources. BMG also offers a design and manufacturing service, to meet exact requirements in small installations and major projects.

For more information contact Willie Lamprecht, BMG, +27 11 620 1581, william@bmgworld.net, www.bmgworld.net
Looking for new ways to reduce costs? Need to better manage risks? Want to continuously improve asset performance during operation whilst maintaining compliance? Endress+Hauser can help.

Today's challenges include heightened cost pressures, tightening of regulations, lack of skilled staff willing to work in a process plant, and the complexity of a multi-vendor installed base with a mix of new and old technologies.

Endress+Hauser offers effective ways to optimise a business by managing activities and sharing expertise. The approach focuses on maintenance that enhances operational equipment effectiveness to reduce the complexity of the installed base and offer the power of metrology to improve aspects of the production process.

Maintenance and calibration management
Let us solve your calibration and maintenance worries while you focus on your core business with total peace of mind. Endress+Hauser offers an extensive portfolio of maintenance and calibration functions. The programme optimises maintenance costs and improves quality to turn routine maintenance activities into a profit source.

Maintenance consulting
Maximise plant availability and reliability. An audit can help reduce plant complexity, even with equipment from different manufacturers and a wide range of instrument types. The primary benefit is a clear overview of the installed base via an exhaustive online database. Endress+Hauser consultants also help define any necessary maintenance and calibration work according to available resources and production requirements.

Calibration consulting
Productive metrology leads to sustainable savings. Endress+Hauser expert consultants are able to optimise metrology functions to reduce downtime, labour, product variability, and save raw materials and energy. This service improves quality while cutting costs, allowing users to optimise productivity over the long term.

Device information and documentation throughout the plant life cycle.
Only a clear picture and detailed knowledge of the installed instrument base can act as a solid foundation for a predictive maintenance and optimisation strategy. Whether you need to find information concerning spare parts, verify software versions, trace instrument history records on the basis of key events, or view the plant database with its installed instruments – the data must be up-to-date and available rapidly. W@M Life Cycle Management supports users in operational matters and also assumes strategic tasks.

For more information contact Endress+Hauser South Africa, +27 11 262 8000, info@za.endress.com, www.endress.com
What’s the difference between round and flat cables?

Understanding how to make reliable connections to an application starts with proper cable selection.

When designing an electronic system, cables are oftentimes the last component specified by engineers. However, when the cable system is expected to last the life of the equipment, it is important to develop a system of cables that are reliable in terms of their durability and ability to maintain proper signal integrity.

Unplanned downtime is unacceptable in any industry or application. Therefore, cable systems represent the ‘lifeline’ of modern machinery. In today’s heavily automated technology, moving applications pose many challenges to design engineers, who have to decide what form of a cable is the best fit – round or flat.

**Application**

Depending on the market and application, round and flat cables each excel in particular settings. Round cables have long been the industry standard, and are used in most applications from automated and general types of manufacturing to renewable energy.

Flat cables, while currently a niche solution, can offer a great method for supplying power and data to machines within the medical, semiconductor, and civil-aircraft markets, among others. Flat or festoon cables are also highly sought after in the overhead crane market for companies that do not want to wind cables around spools.

**Performance criteria**

**Electrical performance**

Electromagnetic interference (EMI): this includes both internal and external sources. Internal EMI protection varies and depends heavily on the cable’s construction. Standard (unpaired) flat cables do not perform well as data cables. If designers run individual screened pairs in a flat cable, it will provide crosstalk and coupling protection pair to pair.

It is very difficult to place an overall screen on a flat cable as the screening material tends to become round i.e. it will not hold a flat form. This makes external EMI protection of flat cables very difficult and not readily available, because this natural shielding tendency provides better protection against external EMI for round cables.

Crosstalk: this is the uncontrolled coupling of signals between two transmission circuits. Similar to EMI protection, using varied pair lay lengths within either a flat or round cable enhances protection against crosstalk.

**Attenuation:** this ultimately determines the maximum length of a signal cable and core resistance, which impacts voltage drop on a power component. In most cases, attenuation tends to be worse when using a flat cable. Higher-quality insulation and proper placement of the ground can improve attenuation, resulting in flat construction. Some very-high-performance (low crosstalk and attenuated) flat cables are produced for certain industries.

**Mechanical stress**

The four main types of mechanical stress placed on cables are rolling flex, torsion, tic-toc, and S-bend. Round cables can withstand all of them due to their natural ability to move in multiple axes at once. In certain applications, round cables are able to withstand 30 million flexing cycles before they need to be replaced. Flat cables are best suited for rolling flex, because this movement is in one linear axis.

Movements that require multiple axes such as torsion can cause the flat cable to bind or only twist to a certain point. Under torsional loads, the cable gets twisted and spooled over a certain length. Thus, every component must be integrated at the right twist and position, and be wrapped or embedded with a PTFE-tape (Teflon), to minimise the friction forces during torsion.

**Environmental stress**

Cables are exposed to many environmental stressors that can cause them to degrade over time if the proper materials are not used during manufacture. Some of these stressors include UV, oil, radiation, abrasion, high or
Condition monitoring of motors

Whether in exhaust systems, pumps or compressors, motors of various sizes are used in production plants and warehouses, quite often in remote locations. Maintaining machines is therefore time-consuming and prone to errors, especially if maintenance personnel are only instructed to perform on-site inspections on an infrequent basis.

Instead, data from multiple motors can be collected, evaluated, centrally displayed and if necessary, linked to alarm actions in order to warn of impending failures in good time. Users can use radio technology to connect Turck’s QM42VT1 vibration and temperature sensor with the high-performance TX700 HMI device for this purpose.

Rugged sensor detects vibration and temperature values
Has the motor become loose, causing the shaft to be misaligned? Is a bearing jammed or is an attachment out of balance? Mechanical vibration can flag up issues such as these. The QM42VT1 vibration and temperature sensor detects vibrations with a high level of accuracy. For this purpose, the compact MEMS-based sensor (micro-electro-mechanical system) is simply mounted directly on the motor block via a magnetic holder. From there, it delivers speed and acceleration data over two dimensions in different frequency ranges. Changes in the measurement data can then be used to identify various forms of damage.

Measuring the temperature of the motors is also vital, as a significant increase in temperature could be an indication of wear or insufficient lubrication on a bearing. The IP67 sensor also detects such temperature changes within a measuring range of -40 to 105°C.

Data transfer and visualisation
Maintenance personnel can wire the vibration and temperature sensor to the battery-powered DX80 radio module. The measured values are then sent to the receiver module of the DX80 system via a proprietary wireless network.

All engine status data can be clearly displayed on Turck’s HMI/PLC TX700. In addition, users can read out historical trends, extract log data or configure alarms such as automatic email notifications. Ethernet connection is also possible, allowing data to be queried through the entire company.

With this stand-alone solution, maintenance personnel can view the status data of all machines, whether on-site, at the HMI, or on company networked computers.

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Neglected pressure gauges can lead to downtime and disaster

Pressure and temperature gauges are often the most used instruments in a plant. Gauges are relatively inexpensive and because of their large quantity, gauge maintenance is often neglected, resulting in unreliable and compromised instruments. Some plants choose not to replace failed gauges until they must, and sometimes that is too late.

A properly maintained, calibrated gauge will accurately indicate how the system is performing. Part of that function is to enable early detection of potential plant failures or accidents. Poorly maintained, inaccurate gauges can compromise a plant’s ability to detect potential problems. Accidents, damage and injury to equipment and personnel is often the result.

Incorrect selection, installation and neglecting to maintain pressure gauges can result in unplanned production downtime, process issues and inferior product quality. In addition, allowing instruments that are critical to the process to drift out of specification could potentially result in a risk to employee safety. The cost of calibration is normally insignificant compared to the potential lost production or injury costs. Ultimately, one needs to be able to trust the reading one gets from the pressure or temperature gauge.

To prevent gauge failure, SA Gauge recommends the following guidelines on selection and calibration be followed:

Working pressure: although pressure gauges will tolerate full scale pressure for short periods, in general, the working pressure should not exceed 70% of the full-scale value. For thermometers, media pressure should not exceed 2500 kPa without the use of a suitable thermowell.

Wetted parts: these must be compatible with the process media. Choose from Cu-alloy (brass) or stainless steel 316. For media that will corrode the wetted parts or obstruct the pressure port, a diaphragm-type chemical seal should be selected.

Process/media temperature: maximum permitted process temperature for pressure gauges with brass wetted parts is 70°C. For stainless steel wetted parts, maximum process temperature should not exceed 100°C. Ambient temperatures are permitted from -20 to 60°C. Errors in accuracy need to be considered when using gauges above or below calibration conditions – usually 22°C.

For applications where process temperatures exceed permissible levels, the media needs to be cooled down before entering the instrument. SA Gauge accessories like cooling towers, siphon tubes, capillary assemblies and diaphragm seals are typical devices used to separate and protect the instrument from the process heat source.

Corrosive and solidifying media: some aggressive or corroding process media will attack copper-alloy or stainless steel 316, or will solidify and obstruct the pressure port of the gauge. SA Gauge’s diaphragm seals are designed to isolate the pressure gauge from the media to ensure accurate and reliable pressure readings. The wetted parts of the diaphragm seal are made from process appropriate materials such as stainless Hastelloy, tantalum or PTFE.

Vibration: due to the mechanical nature of pressure gauges, vibration is one of the main reasons for premature failure. Linkages, gears and bushings are all parts suffering from excessive wear when exposed to vibration. Pointer oscillation makes accurate reading difficult, but can be avoided by filling the gauge with glycerine or silicone oil. Liquid filling of gauges lubricates all the friction points, ensuring longer instrument life.

Pulsation: dynamic load cycles of pumps and valves that cause a rapid change in pressure in a system causes metal fatigue in the elastic bourbon sensing element, resulting in gauge failure. Whilst glycerine filling of the gauge will assist against pointer flutter, it cannot prevent the damage caused by pulsation to the bourdon tube. A flow restricting device is the best option here. SA Gauge’s pulsation dampers such as inlet-restricting or piston-type snubbers restrict the pressure pulsation.

Over pressure: this typically occurs when a pressure gauge is subjected to a sudden rush of process pressure, such as when full bore valves are quickly opened under load. This short ‘spike’ in the system subjects the gauge to more pressure than it is designed for, resulting in permanent damage. To prevent this, SA Gauge manufactures an overpressure protector that can be adjusted and locked to shut the process pressure off at a given set value. The protector automatically opens again once the over pressure condition has passed.

Installation: always secure the instrument by means of a suitable wrench on the hexagon/square of the threaded connection. Twisting the instrument by hand on the case can cause damage to the internals of the instrument. For gauges with flanges, support the gauge fitting with a suitably sized wrench to counter the force of tightening the process fitting. This will prevent damaging the gauge internals.

Calibration: even the highest quality instruments are subject to drift over time, resulting in inaccurate measurements and substandard performance. It is important that all instruments are calibrated by approved personnel. Calibration intervals and error limits should be defined, and records of the calibration results should be kept, maintaining instrument integrity. SA Gauge’s calibration laboratories are SANAS ISO/IEC 17025 accredited and maintain the highest accuracies to ensure international traceability.

For more information contact SA Gauge, +27 11 021 8082, sales@sagauge.com, www.sagauge.com
Kobold optimises gas burner maintenance

Whenever the flow of gases needs to be adjusted or monitored, Kobold’s model UTS variable area flowmeter for monitoring gas burners offers a solution. This compact measuring instrument can be placed at various locations, precisely where required. Recently, the company was tasked with optimising gas burner production line monitoring in order to achieve a ‘No Product Rejection’ status.

The task
Lighting machine manufacturers generally require several small and one large annual maintenance sessions on their production lines. This means shutting down (completely dismantling) the production lines. All failures are to be fixed, broken or worn parts replaced, burners and valves refurbished and production lines reassembled.

It is only after such maintenance, that production restarts. Each production phase of the renewed line must be resynchronised, each burner reset at the correct temperature and the entire production process adjusted in order to manufacture the highest-quality product. This requires not only precision but is time consuming and involves a significant quantity of reject product. The time consumed and the wasted goods cost money, which may result in a serious competitive disadvantage in the market.

Kobold’s UTS solution
Production lines are equipped with UTS type variable area flow meters: one built into each gas circuit for burner control. Retrofitting of machines without major modification, even with 10-20 flowmeters, is easy due to UTS’s compact design and small footprint. When a production line produces a perfect product, the process values are recorded. Following the next shutdown, and before starting, all burners are set up to the recorded values. It takes only a few seconds then to set each burner for optimal operation. Production can then be restarted in a short time and the quality of first finished product is always perfect. Total investment is returned after only a few maintenance cycles. Other typical examples include monitoring engines and the supply of laboratory equipment with different gases.

For more information contact Instrotech, +27 10 595 1831, sales@instrotech.co.za, www.instrotech.co.za
The CFT Group designs and builds production lines and turnkey systems primarily for the food and beverages industry. One of its customers, Menz & Gasser, which specialises in producing and packaging preserves and honey in portions for hotels, restaurants and catering, had CFT develop a rotary filling plant to a very high specification. The plant was to meet strict safety requirements and increase production capacities, while being exceptionally user-friendly. Key elements were extreme ease of maintenance of the machines, ideally during operation. To achieve this, CFT turned to motion control solutions from the Siemens portfolio. This ensured that not only were the customer’s strict safety requirements satisfied but the cost for planning and commissioning each individual machine could be reduced by approximately 30 percent due to the Siemens technology.

One of the key factors in the filling process for Menz & Gasser is safety – for both plants and employees. This is particularly important when employees, for example, have to have access to the interior of the machines during the filling process for monitoring or maintenance purposes. “It is very important for us that we provide a guarantee to operators that they can work safely when the protective enclosure is raised,” explains Ruggero Zanco, the manager responsible for industrial automation at Menz & Gasser, “and the use of up-to-date solutions from Siemens is the primary reason we are able to meet this requirement.”

Up to 30 percent cost saving
The basic precondition for safe intervention is precise throttling of the speed and control of the torque. “It is not only parts moving within the machine that pose a danger but also the liquids used to clean and sterilise it,” says Filippo Tedeschi, filler and seamer automation manager at CFT. The CFT experts therefore turned to the extended functionalities of the Siemens Simotion motion control system to complete this demanding task. The motion control ensures that not only do all the axes inside the machine come to a complete standstill when an operator intervenes, but that they also retain their position and start up again quickly and efficiently once the work is finished. Project planning is carried out in the TIA (Totally Integrated Automation) Portal engineering framework. “Thanks to TIA Portal and its associated software solutions and diagnostic tools, we have succeeded in reducing the working hours for planning and commissioning by approximately 30 percent for each individual machine,” explains Tedeschi.

The next step – up into the cloud
Tedeschi can see potential and benefits from the installed Siemens technology in areas other than just commissioning: “The expanded diagnostics mean we can offer a significantly more efficient after-sales service for our customers for both test runs and customer service itself.” CFT is also using the condition monitoring system for predictive maintenance and is now planning the next steps. According to Tedeschi: “The next project we would like to tackle with Siemens is using its MindSphere cloud solution to increase the effectiveness and efficiency of our performance even further by processing and monitoring the vast quantities of data our machines produce. This will allow us to improve our machine quality even further and launch more innovative machines onto the market.”

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The Direct Select from Turck Banner makes it easy to communicate the critical information staff need to complete tasks. This versatile operator interface can be used to send and receive requests, acknowledgements, and alerts, as well as provide quantity details, direct staff to a specific location, guide operators through a process, track performance, monitor assets and more.

The autonomous wireless design of the Direct Select makes it easy to add an operator interface to any asset, machine or piece of equipment. Use it as a panel meter for local monitoring of asset conditions. Communicate with operators on mobile equipment. Turn any cart into a mobile picking station. It can even be used as a handheld device so staff can communicate important information when they are away from their workstations.

Quickly resolve problems and reduce downtime
Monitor multiple machines, workstations or processes with a single Direct Select operator interface. The multicolour indicator provides high-visibility alerts and status information for each event. The LCD screen indicates the location of the event. The system can even be configured to prioritise events so users can resolve the most critical issues first.

Complex processes can also be simplified. The eight-colour indicator and LCD display provide location and quantity information at each step to communicate adjustments in quantity and other changes with the tactile buttons or use the touch button to send confirmations and alerts.

The Direct Select communicates over a robust Sure Cross wireless network and is powered by a lithium battery. Users can quickly deploy one or many operator interfaces without the time, hassle and expense of adding or altering wired infrastructure to connect and power devices.

Applications
The Direct Select operator interface makes it easy to improve communication between staff, supervisors, assets and equipment in a wide range of applications, including:

- Call for parts, pickup or service.
- Operator guidance and instructions.
- Kitting, pick-to-light and put-to-light.
- Two-way communication on mobile equipment.

For more information contact Brandon Topham, Turck Banner, +27 11 453 2468, brandon.topham@turckbanner.co.za, www.turckbanner.co.za
Faster Couplings has for more than sixty years designed and manufactured over five hundred million quick-release couplings and registered more than eighty patents. The product portfolio comprises a multitude of solutions for mobile, construction, agricultural, special purpose vehicles and industrial and industries. The product categories are grouped into the three focused areas of couplings, castings and cartridges, and the Multi Faster ranges.

The MultiFaster range now includes more than 50 different products, used in various fields of application. “The system is composed of two plates, a lever, and several hydraulic couplings with electrical connectors. The multiple pins are connected with one single manoeuvre, which makes it a convenient way to connect hydraulic circuits to attachments or loaders. The number of connecting lines depends on the functionality required, which allows compact solutions for effortless connection in applications where residual pressures exists.

Faster has introduced the following new MultiFasters options: PH…S series for heavy duty applications: differences between the PH…S and the current series are black cathophoresis instead of red paint, and the handle and cams made of carbon steel with Zi-Ni plating instead of stainless steel. The PH and PH…S series are 100% mutually interchangeable.

MultiGrease: a unique MultiFaster with a special dedicated line for central lubrication systems, one integrated electrical connector (7 pins) and two hydraulic lines 1/2”. The special grease couplings are mounted on the fixed plate of the MultiFaster and allow the circulation of the lubricant.

PC206: the new compact MultiFaster has 2 lines sizes and allows connection through a mobile plate or standalone counterpart couplings. There are dedicated push buttons, one in yellow and one in green, allowing the disconnection of standalone counterpart couplings. With working temperatures from -25°C to 100°C, PC206 is an ideal solution for both agricultural and construction equipment attachments. This mechanism of connection of standalone couplings, can be found in another Faster product: the PSA06.

In 2019 Faster introduced the MultiFaster configurator software, which allows customers virtual assembly and customisation of their MultiFaster product, according to application-specific requirements.

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Detect plant maintenance requirements

The new smart ifm position sensors provide signals to alert operators before problems become critical. High resolution allows the sensors to detect even small changes in the switching area. In addition to the primary position sensor functions, they also provide additional information for condition-based maintenance in user applications. The MQ2 continuously detects ferromagnetic objects in front of its active face and signals soiling via IO-Link when the current value exceeds the set threshold, so that cleaning can be timeously arranged.

The same applies to changes in the switching area, e.g. caused by mechanical wear. The integrated operating hours and switching cycles counter allows the provision of a signal if the selected number of switching operations has been reached, enabling targeted maintenance to be performed.

For more information contact ifm - South Africa, 0861 436 772,
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The LT1200 panel mount process indicator is a precision digital indicator for interfacing to and measuring most process variables. The LT1200 is capable of measuring and processing variables such as mA, volts, potentiometers, frequency and counting, and also has built-in functions such as an event timer, real-time clock (RTC option required) and a manual analog output station (Analog out option required). The LT1200 also includes a multiple output excitation voltage selection for sensor excitation of two or three wire transmitters, encoders, potentiometers and more.

Calibration of the analog process variables is simply done by either entering in the display range selection or by direct sensor injection calibration. The high bright 6-digit 14-segment LED displays make for easy setup and readability. A simple menu system with built-in help hints allows for easy configuration of display and sensor settings.

A universal mains switch mode power supply (85-264 VAC) is provided as standard but an optional low voltage (10-30 VDC) isolated power supply or a high voltage (25-70 VDC) isolated power supply can be installed. RS-232 communications is supplied as standard with the Modbus RTU and Modbus ASCII protocol. A simple ASCII out protocol is also provided for serial printing and communicating to large displays. A second communication RS-485 interface can be added if required.

For more information contact Glen Webster, Loadtech Load Cells, +27 12 661 0830, glen@loadtech.co.za, www.loadtech.co.za

Procentec Mercury

With the increased complexity of industrial networks comes the need for devices that provide an easy-to-understand overview of the status and health of the infrastructure. The Procentec Mercury is a robust mobile tablet for delivery of a new cross platform software package. This device is perfect for troubleshooting, maintenance and monitoring of industrial Ethernet and Profibus networks.

The Mercury combines the power of the ProfiTrace and the Procentec Atlas. It is based on Osiris, the same software as Atlas uses for industrial Ethernet diagnostics and therefore offers the same easy to use interface. When combining Mercury with ProfiTrace, it offers a new software package for troubleshooting Profibus networks.

Overall this device offers the ability to mobile monitor all Profibus and industrial Ethernet networks in a facility. Since the software is pre-installed, the device is ready to use immediately.

For more information contact Industrial Data Xchange, +27 11 548 9970, info@idx.co.za, www.idx.co.za
Maintenance, Reliability & Asset Optimisation Directory

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Beckhoff implements open automation systems based on PC control technology. The product range covers industrial PCs, I/O and Fieldbus components, drive technology and automation software. The Beckhoff 'New Automation Technology' philosophy represents universal and open control and automation solutions that are used worldwide in a wide variety of different applications.

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ralphr@varispeed.co.za
www.varispeed.co.za

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1493 Mailship Road, Laser Park, Honeydew
Tel: +27 11 795 3249
info.za@vega.com
www.vega.com

Vepac Electronics
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Marlboro, Sandton
Tel: +27 11 454 8053
Cell: +27 81 241 6709
sales@vepac.co.za
www.vepac.co.za

Westplex
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www.westplex.co.za

Wika Instruments
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www.yellotec.com

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Cresta, Johannesburg
Tel: +27 11 831 6300
info@za.yokogawa.com
www.yokogawa.com/

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High Performance, No Glare

HIGH-PERFORMANCE THERMAL CAMERA WITH VIEWFINDER
The FLIR T840 infrared camera is designed to help electric utility and other thermography professionals comfortably survey equipment both indoors or outdoors and seek out signs of failure all day long. Thanks to an integrated eyepiece viewfinder and a bright 4-inch color LCD display, the FLIR T840 makes it easy to conduct inspections outside in bright, challenging light conditions. The 180° rotating lens platform and thoughtful ergonomic design helps users quickly diagnose failing components in hard-to-reach areas.

www.flir.eu/T840
# Hardware: Calibration, configuration & adjustment

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| **Atlanta Instruments**                        |
| **Automation & Control Solutions**             |
| **Bearing Man Group & A BMG**                  |
| **Beling Supply Services BEP Bestobell**       |
| **BEMET Measurement and Control**              |
| **Business Connexion & Industrial Solutions** |
| **C&F Technologies**                           |
| **Comtest**                                    |
| **Craigalor Distribution Co.**                 |
| **Emerson Automation Solutions**               |
| **Evantech**                                   |
| **FLIR Systems**                               |
| **Horne Technologies**                         |
| **Hydrasales**                                 |
| **Hytec South Africa**                         |
| **Impact Instruments**                         |
| **INDECON Instrumentation**                    |
| **Industrial Automation & Control (IAC)**      |
| **Infrared Industrial Surveys**                |
| **Instrotech**                                 |
| **Instru-Serve**                               |
| **Karma Instrumentation & Control**            |
| **Martec (a Pragma company)**                 |
| **Mecosa**                                     |
| **Microes**                                    |
| **MOOG SA**                                    |
| **Moore Process Controls**                     |
| **NAZ Instrumentation & Control**              |
| **NewEclectic Pretoria**                       |
| **OEN Enterprises**                            |
| **Opaque Reference Equipment**                 |
| **Osiris Technical Systems**                   |
| **Parker Hannifin Sales Company South**        |
| **Pinnacle Instruments SA**                    |
| **PReO Instrumentation**                       |
| **Procontrol Instrumentation**                 |
| **Production Reporting**                       |
| **R&I Instrumentation**                        |
| **Rockwell Automation**                        |
| **RTS Africa Technologies**                   |
| **SICK Automation Southern Africa**            |
| **Siemens Digital Industries**                 |
| **SKF South Africa**                           |
| **SMC Corporation South Africa**               |
| **Spectranalysis**                             |
| **SSE**                                       |
| **TANDM Technologies**                         |
| **Tilt-Tech**                                  |
| **TLC Engineering Solutions**                  |
| **Turck Banner**                               |
| **VA Instrumentation**                         |
| **Vepac Electronics**                          |
| **Westplex**                                   |
| **Yellow Technical Services**                  |
| **Yokogawa South Africa**                      |
# Hardware: Test & monitoring

| Product & Services                                      | Bench | Hydraulics fluid analyzer | Instrumentation power supply | Insulating oil analyzer | Lubricating oil analyzer | Crack detectors | Ultrasonic tester | Handheld portable | Data logger | Electrical motor tester | Multimeter | Other | Other | Other | Other | Other | Other | Other | Other | Other | Other | Vibration/balance |
|--------------------------------------------------------|-------|---------------------------|-----------------------------|-------------------------|--------------------------|---------------------|-----------------|-----------------|----------------|-------------|---------------------|------------|------|------|------|------|------|------|------|------|------|------|------------------|
| Actum Group                                            |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Adroit Technologies                                    |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| A2S3A                                                  |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Anatech Instruments                                   |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Artic Driers                                           |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Associated Technology                                  |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| AT Technical Services & Supplies                       |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Atlanta Instruments                                    |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Automation & Control Solutions                         |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| BAMR                                                   |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Bearing Man Group t/a BMG                             |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| BEMET Measurement and Control                         |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Blanes Instruments                                     |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Blanes Pressure Solutions                              |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Business Connexion & Industrial Solutions              |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
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| Contilex                                               |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Concilium Technologies                                 |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| CraigCor Distribution Co.                             |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| CT Hydraulics (Nqoba)                                  |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Daytronik Solutions                                    |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Denver Technical Products                              |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Emerson Automation Solutions                           |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Endress+Hauser South Africa                            |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Evanet                                                 |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Feedback Electronics                                   |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| FLIR Systems                                           |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Helukabel                                              |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Horne Technologies                                     |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Hybrid Automation                                      |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Hydrasales                                             |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Hytec South Africa                                     |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| ICS Instrumentation & Control Systems                  |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Impact Instruments                                     |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Industrial Automation & Control (IAC)                  |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Industrial Data Xchange (IDX)                          |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Insttech Calibration Services                          |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |
| Instrotech                                             |       |                           |                             |                         |                          |                    |                 |                 |               |                        |            |      |      |      |      |      |      |      |      |      |      |                  |

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