

Top tools for efficient operations

Paul Feenstra from Fluke – the global technology leader in the manufacture of compact, professional electronic test and measurement tools and software, locally represented by COMTEST – shares the top three trends that are enhancing operational efficiency in today's industrial environments.

Rising energy costs and more stringent legislation guiding sustainable practices are spurring companies to re-evaluate processes and seek new tools and technologies to reduce waste and overcome operational challenges in today's industrial environments.

Challenges posed to industrial operations managers by the pandemic have now been superseded by the rising cost of energy, and the need to deliver on net zero ambitions. As the price of energy continues to increase, the need to reduce costs and deliver on shared sustainability goals intensifies for small-to-medium sized enterprises through to large corporations.

Paul Feenstra, Vice President Fluke for Europe, the Middle East and Asia (EMEA) at Fluke says: "We are working together with our customers to help drive new initiatives to improve operations, increase efficiencies, and take reliability to a new level in the 21st century."

Reducing energy costs with upgraded technology and cloud-based data monitoring

Approximately 90% of all companies use compressed air in some aspect of their operation, such that it is often referred to as the fourth utility. Recent developments in industrial acoustic imaging technology have enabled the fast identification of leaks in compressed air systems used in industrial and manufacturing environments. Fluke's ii900 Industrial Acoustic Imager features an array of microphones, providing visualisation of sound field within an expanded field-of-view and at a distance of up to 70 m. This enables maintenance teams to visually locate air leaks very quickly and accurately in compressed air systems.

Beyond the improvement of rugged handheld tools, monitoring practices are also evolving with the use of internet-connected instruments. Analysis and data are captured on a cloud platform allowing operators to monitor the key performance indicators (KPI) of compressed air systems, including energy, electric power, flow, pressure and leakage flow.

Fluke's LeakQ Report Generator creates detailed air compressor leak reports from images captured by Fluke ii900 or the Fluke ii910 Precision Acoustic Imagers and

calculates the energy savings once the leaks are repaired.

Using data to deliver predictive maintenance

For generations, maintenance professionals have used preventive maintenance to avoid equipment failures and turned to reactive maintenance when assets fail. With the emergence of Industrial Internet of Things (IIoT) technologies, maintenance professionals can now connect tools, software and sensors to collect, store and analyse multiple data sources in one place.

The pandemic accelerated investment in these technologies that make remote monitoring possible. The technology enables reliability and maintenance teams to meet up-time requirements no matter how fluid on-site staffing might be. The trend for remote monitoring will continue, with small-scale operations turning to remote condition monitoring services.

Artificial intelligence (AI) and machine learning (ML) have held the promise to quickly identify trends and adapt quickly to changing operational conditions. Software armed with prescriptive analytics is finally meeting up with modern condition-monitor-

ing hardware to spark a revolution in the use of AI/ML in maintenance operations.

Now a new race has emerged to pair that hardware and software with ML and AI algorithms. Companies such as Fluke are working to combine technologies so that the software can identify trends, recognise data patterns and make specific recommendations for equipment maintenance.

Digital SI speeds integration of equipment measurements

The accelerated uptake in digital measurement solutions for industrial applications can save time and money whilst facilitating a shift towards predictive maintenance for systems. Although modern measurement digital devices are typically not fit-and-forget solutions, the increase in digital measurement solutions paves the way for verification technologies that can help to reduce the maintenance burden on personnel, without compromising on accuracy or reliability. Digital SI (International System of Units), an initiative created as part of the industry 4.0 revolution, relates to the creation of a globalised system to transmit calibration certification information electronically. This is critical as the exchange of data and the



Fluke's ii910 Precision Acoustic Imager has dual uses: for the detection of compressed air leaks and particle discharge.

data itself are the basis of highly automated industrial processes.

The Digital SI system ensures measurement traceability from all calibrations performed and enables sharing of information in a paperless manner. This speeds up the integration of measurements that can be performed using critical test equipment as part of integrated factory-enhancing maintenance and plant efficiency.

"The tests we have faced within the past 24-36 months are delivering a growing awareness among top management that fundamental changes in maintenance best practice need to occur in order to protect the bottom line," says Feenstra.

"This is music to the ears of progressive industrial managers who have long been advocating for investments to improve efficiencies and reliability of systems. Now is the time to make the case to adopt innovative technologies, tools and processes to ensure your company



Fluke's ii900 Industrial Acoustic Imager captures still and video images of compressed air leaks at a facility.

maintains a competitive edge and thrives in this new environment,"

he concludes.

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Keller level monitoring and measurement

It is a fact that most drinking water comes from groundwater. No longer confined to the Global South, general water scarcity is now an ever-present issue in technologically developed countries as well. Climate change, forest fires, glacier melting and the resulting rise in world sea levels are all arguments in favour of proper, well-thought-through management of groundwater resources.

Furthermore, monitoring the fill level in tanks or sealed containers of oil or similar liquids is very important, especially on cost grounds, and can also double as theft protection. Determining the exact fill level right down to the centimetre can therefore save users a fair amount. Using an additional radio module, a purchase order can be triggered automatically in various applications as soon as the fill level falls below a certain threshold. The most common form of electronic fill level measurement is hydrostatic pressure measurement.

Hydrostatic pressure is the pressure that forms within a liquid or gas at rest due to the influence of the force of gravity. The fluid at rest exerts a dead weight on the layers below as a result of its mass. Neither the type of medium, nor whether the fluid is in motion plays a role here. Dynamic pressure due to flow is not recorded.

Hydrostatic pressure can be measured in either an open or freely accessible container or body of water as well as in a sealed tank with positive or negative pressure. In all cases, the actual fill level is determined in consideration of the ambient pressure. The pressure of the gas trapped above the liquid must also

be factored in if the container is sealed. This is done by taking another pressure measurement on a second transmitter, which is usually screwed into the side of the tank. The formula below can be used to calculate the hydrostatic pressure while factoring in ambient pressure and can be applied to open bodies of water and fluids at rest (static) in containers.

$$p(h, p_0) = pgh + p_0$$

A differential pressure measurement to factor in p_0 (lid pressure) is used for sealed containers. To factor ambient pressure into open scenarios, measurements are taken using relative pressure probes or AA (absolute-absolute) technology.

When monitoring groundwater/fill levels in open bodies of water or outdoors, the measuring points may be relatively far away and difficult to reach. For these applications, KELLER Pressure has solutions involving level loggers via short-range radio interfaces as well as level loggers with a remote data transmission unit via GSM or the Internet.

Kolibri Cloud/Desktop is used to process, analyse and prepare the collected data. These products for hydrostatic measurements feature:

- Submersible level probes for level and fill measurement: With a special design and cable and housing materials that have been chosen for compatibility with their surroundings, these probes can be used in a wide range of liquids.
- A variety of data logger designs for recording pressure and temperature profiles: Depending on the system, the data is read out via a plug

connection or remote transfer.

- Multi-parameter data loggers such as the DCX-22-CTD measure conductivity and temperature as well as pressure, along with the depth of bodies of water. The integrated Pt1000 achieves an accuracy of $\pm 0.1^\circ\text{C}$, and the conductivity can be measured at $\pm 2.5\%$ of the selected range (0.2/2 /20/200 mS/cm). Thanks to their long-life battery, they can keep recording measurement results for years up to 10 years at a rate of one measurement per hour). The logger can be configured using the supplied software measurement interval, incident management, delayed measurement start etc – and data that has been read can be displayed in a graph or chart, corrected using air pressure values, converted into fill levels or other units, and exported.

In addition, the KOLIBRI CLOUD Web app can be used for collecting and displaying measured values that are recorded by KELLER IoT devices and transmitted via mobile radio or LoRaWAN. KOLIBRI Cloud offers a wide variety of options for device configuration and displays current measured values and logger recordings in graph form.

Thanks to the search and filter options, saved measurement data can be organised with ease and can also be exported as an image, as an Excel or Word report or in other formats. Existing software solutions can be used to access data in KOLIBRI Cloud via JSON API. All products in the KOLIBRI suite are inter-compatible and can exchange data with one another. The functions are continually being further expanded and optimised.

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