PROCESS INSIGHT SOLUTIONS

OCTOBER 2023

SENSORS

WITH EXPERT CONTRIBUTIONS FROM:

ENDRESS+HAUSER
SICK
WAJAX

Canadian PROCESS EQUIPMENT & CONTROL NEWS

Endress+Hauser SICK Sensor Intelligence. WAJAX

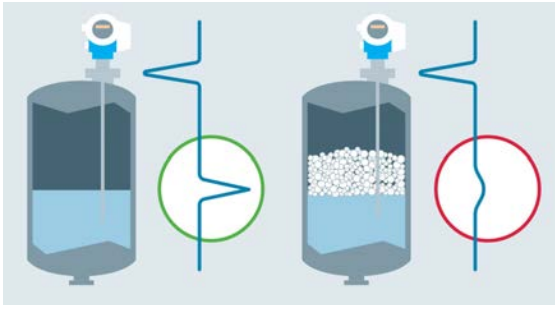
TABLE OF CONTENTS

Historically, the process industries have been conservative in adopting new technologies for a very good reason. In contrast to other highly automated industrial sectors, processors carry the burden of providing wider public safety in addition to immediate personnel on-site. Cloud- and network-monitored process systems are inherent targets for hackers and Internet-based bad actors. But all of this is changing with advanced, cybersecure software and hardware advancing to the for — along with networked, highly intelligent embedded sensors. And sensors today continue do what they always have done, providing their monitoring and control functions to the first line of safety defence. More and more, sensors are also feeding the need for processing enterprises to harvest data, integrated safety, maintenance, and productivity..

3... **HeartBeat Technology**
Endress+Hauser gets the jump on employing smart sensor intelligence

7... **Deep Learning**
SICK reveals how sensor intelligence is the "game changer" for automation and efficiency in industry

8... **Maintenance Steps Up**
Wajax takes wireless connectivity across operations to ensure equipment reliably



SENSORS
Process Insight Solutions

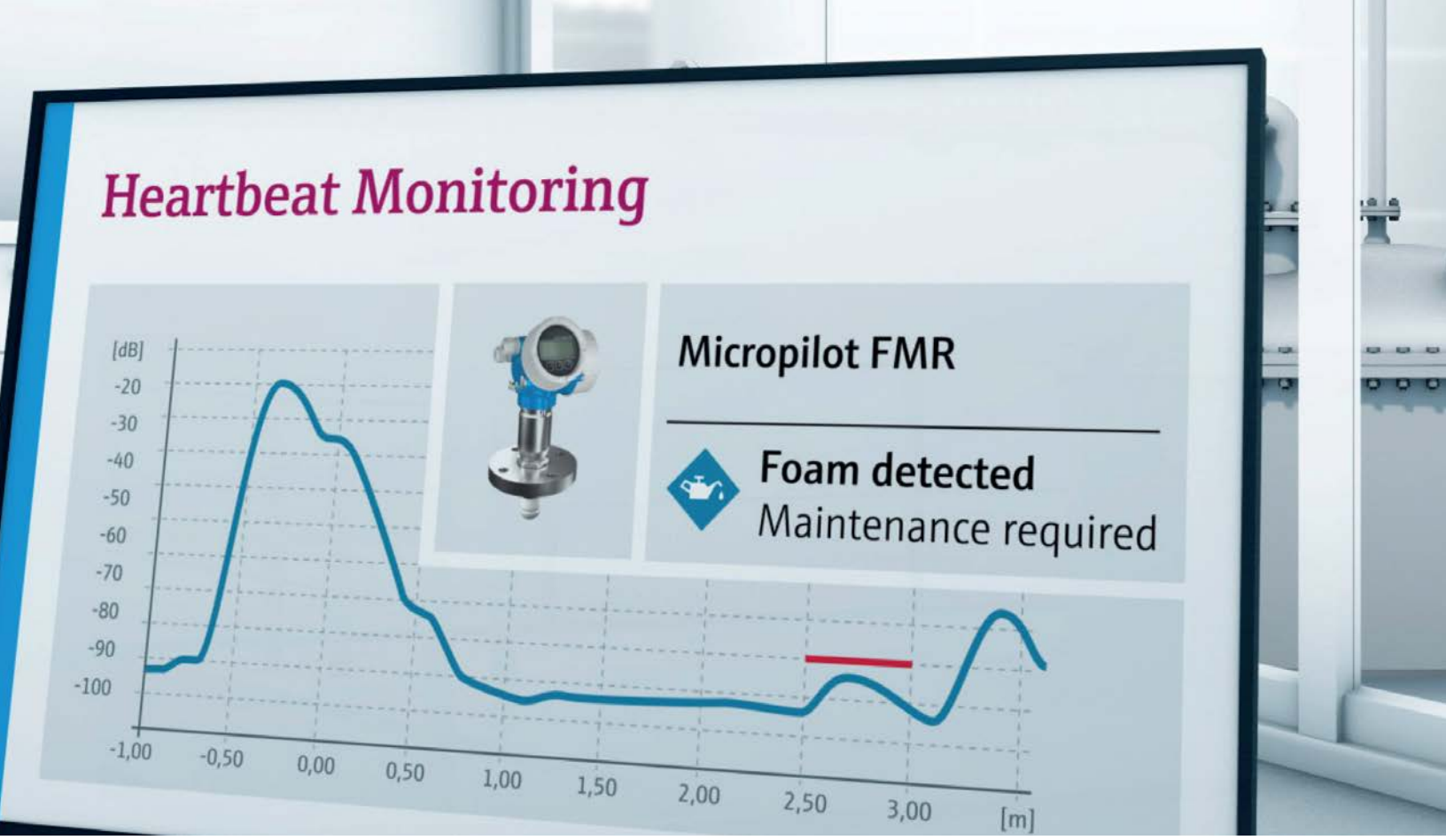
OCTOBER 2023

PUBLISHER/AD SALES: Pat Lorusso
PLorusso@annexbusinessmedia.com

EDITOR: Mike Edwards
editor@cpecn.com

Canadian PROCESS EQUIPMENT & CONTROL NEWS

Produced By
ANNEX BUSINESS MEDIA



HEARTBEAT TECHNOLOGY: GETTING THE JUMP ON EMPLOYING SMART SENSOR INTELLIGENCE

By Endress+Hauser

International studies have estimated that around 5% of data generated in production globally actually gets analyzed in depth, if it is analyzed at all. That's a finding "that closely matches our own experience," says Dr Rolf Birkhofer, Managing Director of Endress+Hauser Digital Solutions. "Even though Endress+Hauser measuring devices have had digital communications capability for years now, the vast majority of our customers have yet to exploit this option."

Then again, with the digitalization of industry unfolding, the future is clearly pointing towards expanded use of sensor data to realize a range of major productivity-enhancing benefits like real-time condition monitoring, continuous process optimization and predictive maintenance with virtually no unscheduled downtime. The Ethernet-APL standard bringing two-wire Ethernet to the field with intrinsic safety is an important milestone on this journey. Its deliverables include dramatically greater speed (10 Mbit/s or 300 times faster than fieldbus, full-duplex, over distances up to 1,000 meters) plus a lot more distributable power (up to 60W on APL trunk lines) compared to 4-20 mA signals.

Creating a unified field-to-enterprise Ethernet network makes sensor data exponentially more valuable and large-scale proliferation of sensors in the field all but inevitable. Such a changeover also represents a major investment, one many operators may defer as long as possible for perfectly sound financial or operational considerations.

Rather than sit on the sidelines watching the future unfold, there is a way to capture some smart sensor benefits within a legacy data eco-system with Heartbeat Technology available on many of Endress+Hauser's measurement and analysis instruments.

Primary measurement values reported by devices like flowmeters or level measurement transmitters don't usually suggest the presence of a problem that could develop into something large and potentially disruptive – until it is disruptive.

Like the proverbial canary in a coal mine, Heartbeat Technology's smart sensor capabilities can provide clear early evidence of disturbed process conditions along with the recommended remedial action.

Heartbeat Technology is available today in much of En-

dress+Hauser's product portfolio for flow, level, pressure and temperature measurement as well as for liquid and gas analysis.

Heartbeat Technology analysis is based on signals that these field devices capture in addition to the primary measured value. Some examples:

- Coriolis flowmeters detect the presence of corrosion by analyzing the vibration behavior of the measuring tube.
- Differential pressure transmitters use sensor noise to detect blocked impulse lines.
- Electromagnetic flowmeters analyze electrical conductivity inside the measuring tube to detect build-up.
- Radar-based level instruments use echo amplitude to determine whether and how much foam has formed in a tank.
- Radiometric level instruments calculate their optimum replacement time based on the declining strength of the radioactive source.
- Analytical transmitters derive performance indicators that help operators to optimize availability of the measuring point and reduce maintenance work.

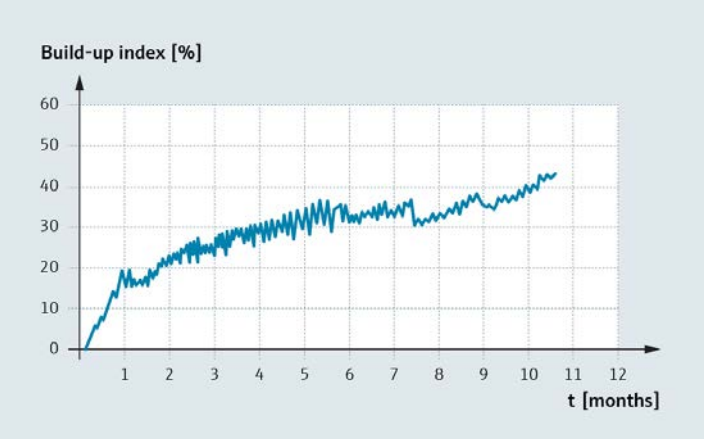
Heartbeat Technology is comprised of three toolsets:

- With Heartbeat Diagnostics, instruments continuously check themselves in the background and report their status. In the event of instrument failure or disturbed process conditions, they provide clear information on what is happening and what needs to be done next.
- With Heartbeat Verification, instrument performance can be verified at the push of a button without interrupting the process. It automatically tests whether device components still retain their original reference values and indicates the presence of specific system faults that might impair instrument or process performance. Self-diagnostics and verification can help determine optimal calibration and test intervals.
- Heartbeat Monitoring recognizes process conditions affecting the device's performance and reliability. It detects these influences and converts them into easily understood process and device messages identifying the device, nature of the issue and action to be taken.

The measuring performance of a device is expected to be very stable over time if it is operated within its intended range of use, as process conditions normally have a minimal influence on the sensor components. However, challenging process conditions may impact the performance of a device, degrading its performance and reliability – like corrosion or abrasion of a sensor's wetted parts, buildup on a sensor's surface or the occurrence of foam in a tank.

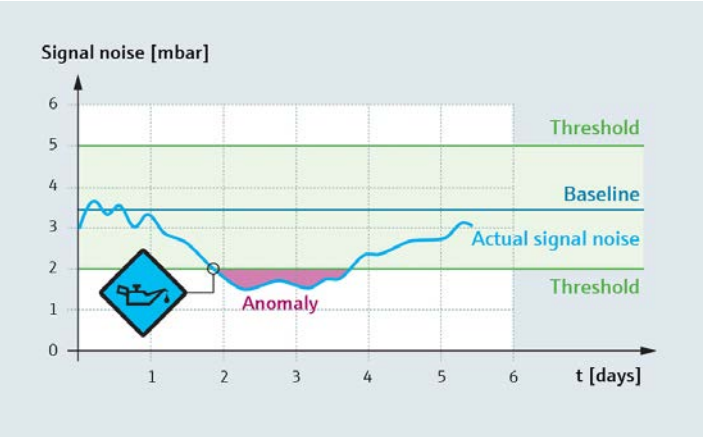
For example, build-up on an electromagnetic flowmeter sensor is indicative of a growing problem that could be degrading system performance and potentially damaging process components. With its signal data, Heartbeat Technology creates a build-up index over a period of months graphing the presence and progression of build-up.

- The index is based on the difference in electrical conductivity between the fluid and the build-up
- The distribution of electrical conductivity within the measuring tube is analyzed to compute an indexed value that changes proportionally when the build-up increases
- The baseline of 0% is set during factory calibration of a new device without build-up and ranges to 100%, which represents the maximum detectable buildup formation.



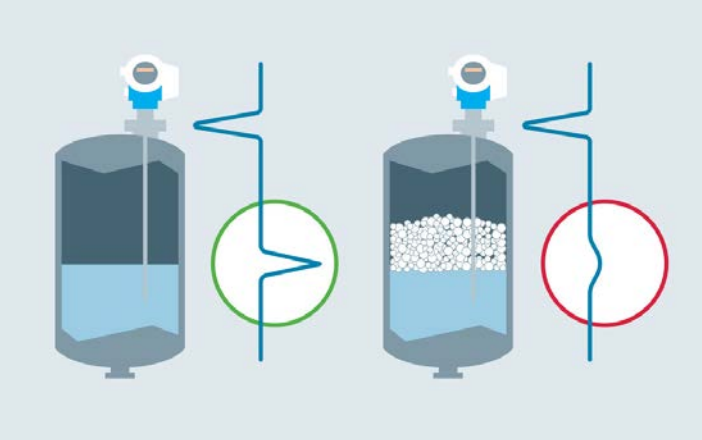
Similarly, measuring the impact of corrosion or abrasion on a Coriolis flowmeter is performed by recording the percentage deviation of sensor integrity from the initial factory baseline(0%). When the reported deviation exceeds 4%, the meter should be replaced.

In a differential pressure transmitter, the signal noise is monitored during operation. In the case of a plugged impulse line (e.g., due to build-up), the signal noise will be affected. If the defined threshold is exceeded, the device will create a diagnostic event (maintenance required).



When foam accumulates in a tank, it represents a sub-optimal use of tank capacity and could potentially lead to poor measurement performance and an overflow of foam. Radar sensors like Endress+Hauser's Levelflex employ relative echo amplitude to de-

termine the level of foam in the tank.. When a certain application specific limit is reached, i.e., when echo amplitude is reduced, a signal can automatically be sent to activate the sprinkler system to reduce the foam level in the tank.

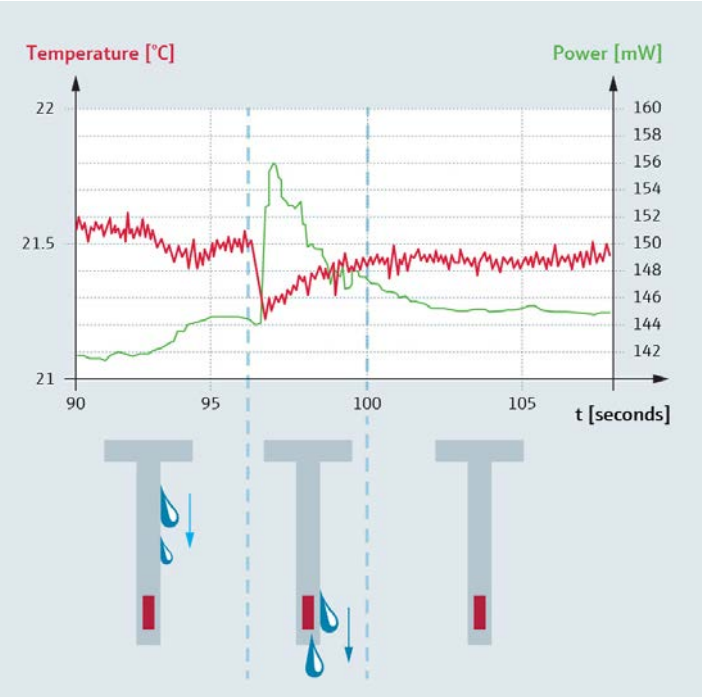


The first video link shows how Heartbeat combined with a Micropilot 80 GHz radar sensor can detect foam buildup, optimize defoaming, and even initiate defoaming automatically. The second video shows the same sensor continuously monitors for build-up.

https://www.youtube.com/watch?v=o8mzc_65c8c

https://www.youtube.com/watch?v=R6xcdGrR8zI

In a thermal t-mass flowmeter, wetness has a significant impact on the calculated gas mass flow rate. Liquid on the sensor has very high heat transfer characteristics compared to most gases, causing an overreading. The stability of the sensor response during the preceding minutes is analyzed using a statistical approach to identify any anomaly. The device can be configured to issue an alarm or warning.



Heartbeat Technology data can be accessed on site, via a Field Xpert tablet or the Endress+Hauser SmartBlue app. From Field Xpert, that data can be uploaded to Endress+Hauser's Netilion cloud eco-system.

However, the potential for value creation increases significantly when the measurement instruments are connected to the process control/asset management systems or even directly to the cloud. Tasks are performed more efficiently and conveniently in such an environment. It makes it possible to access additional Heartbeat Technology functionalities like generation of a verification report or monitoring of Heartbeat parameters.

In Netilion, Heartbeat Diagnostics' device-specific data can be viewed remotely on the digital asset twin. There also are options for customers to run the Heartbeat Verification function from Netilion.

Heartbeat Technology represents an opportunity to embrace some of the benefits of smart sensor technology without having to make significant capital investments to digitalize some or all of a facility's communications network. Over time, Heartbeat Technology also allows operators to develop a better understanding of where anomalies tend to develop and how long it takes them to become significant, providing the basis for predictive maintenance backed, visually, by what Heartbeat Technology continues to tell them.

Eventually, the time will be right for embracing full scale digitalization because the benefits are huge, and compelling. At that point, legacy Endress+Hauser instruments with Heartbeat Technology can be branched into Ethernet-APL topologies – or even better, replaced as their service life ends with the comparable Endress+Hauser device with Ethernet-APL connectivity built in and Heartbeat Technology on board.

For more information about Heartbeat Technology, download the brochure here or watch the video.

https://cx.endress.com/ca-cpecn-sensors-ebook-hb-brochure

https://www.youtube.com/watch?v=8rMDE3pONp8

For more information about Endress+Hauser's commitment to Ethernet-APL networking, watch this video.

https://www.youtube.com/watch?v=OYCkTptlViY

For enquiries, please contact:

Hailey Barton
Marketing Communications Specialist
Endress+Hauser Canada Ltd.
1244 International Blvd.
Burlington, ON L7L 0K2
Phone: +1 905 681 4080
Mobile: +1 289 983 1897
hailey.barton@endress.com
Website: www.ca.endress.com

Heartbeat Technology takes the pulse of your measurement to save costs:

Heartbeat Technology

- Permanent diagnostics of processes and devices guarantee an economical maintenance and safe plant operations.
- Verification of devices happens without process interruptions. It ensures high plant availability.
- Monitoring of all information enables predictive maintenance and process optimizations.

70 years
The pulse of measurement technology

Do you want to learn more?
www.eh.digital/cpecn_heartbeat_ca

Endress+Hauser
People for Process Automation

THE NEW ERA OF SENSOR INTELLIGENCE – THE TRUE POWER OF AUTOMATION

Deep learning: the "game changer" for automation and efficiency in the industry.

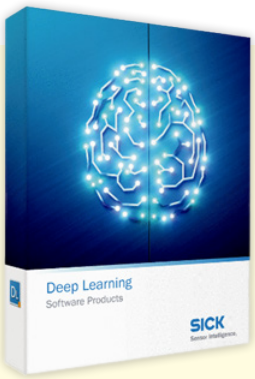
To us at SICK it means something very special. We see it as the key to enter a new era of sensor intelligence. It means the possibility to solve more demanding tasks. To quickly adapt to changing conditions. To easily recognize patterns more quickly and reliably than ever before. Valuable data is collected by our sensors, interpreted by our algorithms, so you can focus on the big picture, optimize your workflows, and make efficient use of your resources.

Unlocking the full potential of Intelligent Sensors with deep learning solutions

Deep learning is a subset of Artificial Intelligence that enables computers to mimic human decision-making and problem solving and is breaking new grounds in industrial automation. Our deep learning solution is user-friendly and allows SICK sensors to be trained for customer-specific tasks with little effort using sample images. The sensors can then evaluate and access objects in line with customized criteria on-site – in machines or mixed-use environments – even if the natural appearance of the objects varies. Our deep learning solutions help you to be more precise, more flexible, and ultimately more successful. We want to give you the key to solve your technical challenges.

With SICK Deep Learning and seamless integration into the SICK AppSpace eco-system using SICK Sensors for advanced perception technologies to enable automation, this ensures an acceptable level of part quality, defect defection needs to be performed using in-line perception technologies. This helps in performing process interventions to remove defects and ensure high-quality production. Humans are integral parts of a high-mix environments, so advanced perceptions technologies are also needed to monitor human activities and ensure safety.

With migration into digital engineering and adoption of Industry 4.0, this has increased use of automation technologies with customers that want to transform operations and increase their level of automation. Many customers have successfully deployed process automation are reporting, automation has helped them in achieving significant improvement in process consistency and capturing human process knowledge through digital analytics.



Deep learning will change industry. Machines will perform tasks that require human intelligence. As the digitalization of processes and the capturing of data in the process automation industry increases. This will allow a more effective collaboration between humans and machines. This will revolutionize automation and production and lead to more efficient and precise decision-making processes, as well as, higher productivity and at the same time significantly lowering development costs.

What to learn more? | Contact Us? | www.sickcanada.com

MAINTENANCE ADVANCES WITH TECHNOLOGIES ACROSS INDUSTRIAL OPERATIONS

By Sada Haque, Wajax

On the rapidly evolving landscape of manufacturing and process operations, understanding customer challenges and addressing their needs is paramount to driving innovation and enabling operational excellence.

As technology continues to reshape the industry, many organizations have positioned themselves as industry leaders by deeply comprehending the pain points faced by their customers.

In this article, we will explore how a customer-centric approach empowers manufacturers to overcome their challenges and achieve transformative results in maintenance, reliability, and operations.

TechIQ condition monitoring sensors (inset, right, and left on motor) leverage wireless connectivity to enable real-time monitoring, early fault detection, and predictive maintenance.

Emerging Technologies: Unleashing Innovation

The manufacturing and process sectors are witnessing the emergence of several transformative technologies that promise to shape the future. Drone inspections enable remote and efficient monitoring of facilities and assets, reducing inspection time and enhancing safety.

In an example of one such potentially transformative technology, the Wajax TechIQ wireless-based monitoring platform started its journey by focusing on augmented and virtual reality (AR/VR), technologies that are revolutionizing training, maintenance, and product design — offering immersive and interactive experiences. Elsewhere, additive manufacturing (3D printing) is driving customization, rapid prototyping, and supply chain optimization. These technologies, combined with AI and data analytics, create new possibilities for innovation, agility, and sustainability.

Connected Systems: Seamless Integration and Interoperability

In the Industry 4.0 era, connected systems also play a crucial role in enabling end-to-end visibility and seamless integration across the manufacturing value chain. From supply chain management to production planning, from quality control to logistics, interconnected systems enable efficient communication and data sharing. This level of connectivity fosters streamlined operations, reduces bottlenecks, and enables real-time optimization. Additionally, it lays the foundation for interoperability between different technologies, paving the way for holistic solutions and agile decision-making.

Robotics and Automation: Transforming Processes

Another fascinating trend is the rise of robotics and automation, and how they have redefined manufacturing processes — driving efficiency, accuracy, and productivity to new heights. Robots are increasingly taking on repetitive, dangerous, and labour-intensive tasks; freeing up human workers to focus on more complex and creative endeavors.

Collaborative robots (cobots) work alongside humans, enhancing safety and productivity on the shop floor. Advanced robotics technologies, coupled with AI, machine vision, and natural language processing, enable adaptive and intelligent automation, transforming the manufacturing landscape.

Addressing Maintenance and Reliability Challenges:

With TechIQ, Wajax recognizes that maintenance and reliability are critical factors influencing operational efficiency for manufacturing companies. With a focus on cutting-edge technologies, companies can enable proactive maintenance

practices that reduce unplanned downtime, optimize asset performance, and extend equipment lifespan.

By leveraging real-time data analytics and predictive algorithms, manufacturers can be empowered to shift from reactive to proactive maintenance strategies, resulting in improved productivity and cost savings. One of the ways to achieve this is by getting equipment to communicate automatically and instantly with one another.

Connected Equipment: Revolutionizing Maintenance and Reliability

The rise of connected equipment, enabled by the Industrial Internet of Things (IIoT), is revolutionizing maintenance and reliability practices. By embedding sensors and connectivity into machines, manufacturers gain real-time insights into their operational performance. This data-driven approach allows for predictive and preventive maintenance, reducing unplanned downtime and optimizing asset lifespan.

Furthermore, the integration of machine learning and AI algorithms enables intelligent decision-making, empowering manufacturers to identify patterns, optimize workflows, and increase efficiency. One of example of how to materialize these concepts are wireless sensors.

Industrial machinery, with its complex and dynamic nature, is susceptible to wear and tear, leading to inefficiencies, unplanned downtime, and potential safety hazards. Traditional wired vibration sensors have limitations in terms of installation, scalability, and maintenance.

This is where wireless vibration sensors come into play, addressing these challenges, and providing a holistic solution. By leveraging wireless connectivity, these sensors enable real-time monitoring, early fault detection, and predictive maintenance; thereby mitigating risks, optimizing operations, and enhancing overall productivity.

Connected People: Empowering the Workforce

The convergence of technology and connectivity is not limited to machines — it also extends to the workforce. Connected people, equipped with wearable devices, smart tools, and augmented reality (AR) glasses, have access to real-time information and remote assistance. This enhances productivity, safety, and knowledge sharing among teams.

By connecting workers to the digital ecosystem, manufacturers unlock new opportunities for collaboration, skills development, and improved decision-making, fostering a culture of innovation and continuous improvement.

Collaboration and Knowledge Transfer

Industry players recognize the importance of collaboration and knowledge transfer in addressing customer challenges. The group fosters an environment of open communication, actively engaging with manufacturers to understand their pain points, goals, and aspirations.

For example, through workshops, training programs, and ongoing support, Wajax TechIQ ensures that their customers are equipped with the necessary knowledge and expertise to leverage technology effectively.

By fostering a culture of continuous learning and sharing best practices, they empower manufacturers to embrace change and maximize the value of their solutions.

Harnessing the Power of Emerging Technologies

It is also key to recognize the service industry's commitment to understanding customer challenges extends to harnessing the power of emerging technologies. Industrial service providers are actively exploring and adopting innovative solutions such as robotics, artificial intelligence, augmented and virtual reality, drone inspections, additive manufacturing, and Industry 5.0 concepts.

By staying at the forefront of technological advancements, Wajax TechIQ ensures that their customers can leverage these tools to drive innovation, improve agility, and achieve sustainable growth.

Enhancing Safety and Worker Experience

The TechIQ team understands the importance of safety and worker experience in manufacturing environments, as all of them have experience working in industrial settings. By embracing augmented reality and virtual reality, they create immersive training programs and simulations that enhance safety practices and improve worker skill sets.

Additionally, by leveraging robotics and automation, they are exploring ways to reduce the exposure of workers to hazardous tasks, mitigating safety risks. Their commitment to creating a safe and engaging work environment ensures that clients can achieve higher levels of productivity, while prioritizing worker well-being.

Conclusion

Taking a client-centric approach, when coupled with an expertise in emerging technologies, can position a company as a disruptive force in the manufacturing industry. By understanding client needs, leveraging emerging technologies, and driving efficiency, productivity, safety, and sustainability, you can empower clients to stay ahead of the competition.

The author, Sada Haque, is Director of Innovation & Technology at Wajax. Find out more about TechIQ condition monitoring at www.wajax.com/techiq.