Sensing technology from Leuze at work facilitating optimum productivity.

Smart sensors, **smart** technology, **smart** manufacturing

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What is the role of sensing technology in the Fourth Industrial Revolution?

The Fourth Industrial Revolution is underway. The world is on the eve of major transformation with the future of industry going through a production paradigm, and significantly sensing technology is entrenched in this major shift.

This is not something made of science fiction. It is documented through numerous articles by the likes of Professor Klaus Schwab, founder and executive chairman of the World Economic Forum, and others. The roadmap report of the European Union comments on the advent of cyber-physical Internet-based systems which will offer innovative capacities that can benefit industry and other economic sectors.

General Electric first used the term Industrial Internet which was coined to describe how digital technology would be incorporated in equipment and machinery as well as in ancillary devices in all production environments.

Manufacturing facilities and plants have been teeming with these Internet 'things' or sensors for the past two decades, but the major paradigm will be Machine to Machine (M2M) communication. And significantly, this will not simply be between machines in a plant or factory but will also be between these machines and all sorts of sensing and monitoring devices and systems.

Essentially there will be integration across entire operations of Information Technology (IT) and Operational Technology (OT). OT is hardware and software that can detect or cause a change through the direct monitoring and/or control of physical devices such as machinery and processes and complete packaging lines.

M2M and HMI

Access to this level of accurate information will allow companies to focus more readily on optimising processes, reducing costs through condition monitoring and predictive maintenance and increasing productivity. All of this will, of course, have a positive impact on the bottom line and will be achieved through M2M communication and enhanced Human Machine Interaction (HMI).

Smart manufacturers are already equipping everything on the factory floor and everything that leaves the operation with sensors and other monitoring devices. Across industries the demand is now for smart machines. Smart machines are IT ready machines. These machines, equipped with sensors to monitor their functioning and performance, are able to communicate with a variety of IT systems in a language that humans can understand and act upon, if and when necessary.

Smart machines

Today, many smart manufacturing operations use smart machines. This ranges across heavy industrial sectors to the food and beverage industry to operations producing consumer goods and especially in the high-tech manufacturing sector. Eventually all machinery, not just that used in an industrial production environment, will incorporate this level of sensing and monitoring. This sensing and monitoring will

HMI – Human Machine Interface/ Interaction
IT – Information Technology
M2M – Machine-to-Machine
OSSD – Open Source Software Development
OT – Operational Technology
RFID – Radio Frequency Identity

Abbreviations/Acronyms

extend to domestic appliances including, for example, televisions, washing machines and even electric toothbrushes, all of which will be able to communicate with users.

Security

M2M communication can bring far greater security to an operation and more importantly, enhanced efficiency and productivity in production processes ranging from agricultural environments like dairy farms through to heavy industrial equipment manufacturers. M2M leverages state-of-the-art technologies to communicate without human intervention, and some of these include microelectronics, wireless, embedded and sensing devices. Interfacing these technologies allows the gathering and distribution of real time data.

Monitor and communicate

Typically the sensing technology or sensors monitor and communicate events ranging from basics like position, shaft rotation, temperature and humidity, right up to quality control functions where the sensor is able to detect out of colour or type anomalies. The sensing technology is able to convert this raw data into meaningful information which is then transmitted via the Internet interface. Sensing technology has been evolving to keep pace with the developments in the manufacturing and production sectors, and while the inherent characteristics of these devices will remain largely intact the manner in which information is transmitted will change from cable to wireless.

Another trend is where new sensor combinations are emerging with a single device capable of monitoring more than one function in an application. An example of this would be a pressure sensor that is capable of monitoring pressure, temperature and humidity. This not only reduces the overall cost of the sensor but also offers the end user a value-add sensing solution.

Another example would be the Leuze RSL 400 safety laser scanner family which incorporates two autonomous protective functions in one device. This saves end users money while still ensuring quality of performance. The device's most important feature is that it has two independently adjustable configurations and two safety-related switching output pairs (OSSDs). Together, with an operating range of 8,25 metres and a scanning angle of 270°, this feature allows two different protection tasks to be performed simultaneously with just the one device.

Miniaturisation of sensors

Miniaturisation of sensors is another important evolution for industry. While this first started within the aerospace and medical sectors, as there was a call for minute lightweight devices, it has carried across to other markets. Smaller sensors which provide the high levels of functionality, reliability and performance are in demand.

Safety in the work place becomes simple with sensing technology.

The safety of personnel is assured with Leuze sensors ensuring safe access.

These devices can be installed in areas and on machinery which would previously not have been considered suitable due to space constraints. An example of this is the Leuze 2 Series sensors which are considerably smaller than a matchbox at only 23 mm by 12 mm by 8 mm. These throughbeam photoelectric sensors, retro-reflective photoelectric sensors and diffuse reflection light scanners are capable of operating at ranges of up to 2 metres. Designed for the detection of small parts these tiny yet powerful sensors are perfect for applications where the user has a confined space but needs a highly flexible solution and good performance.

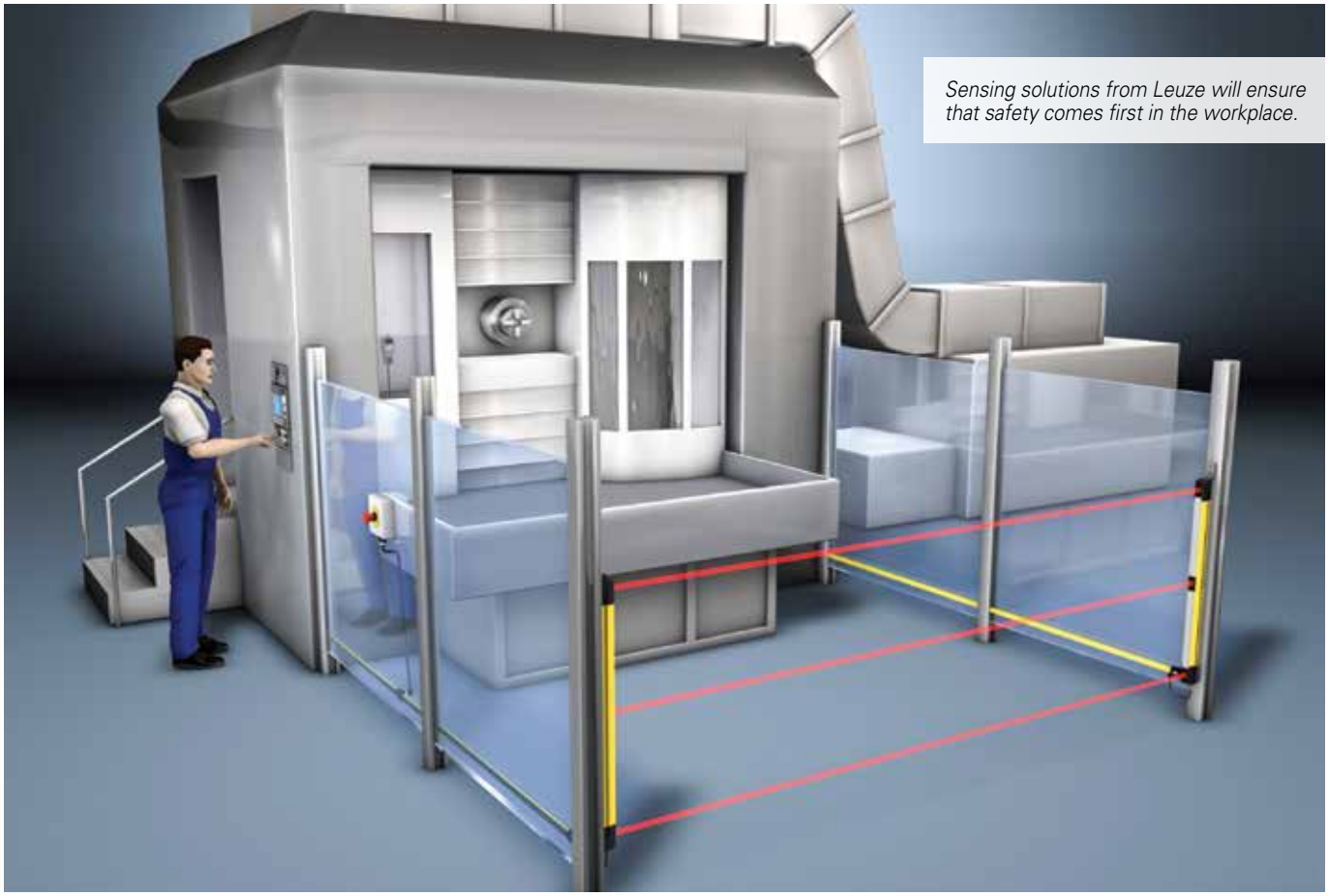
> *Across most, if not all, industries the demand is for 'smart machines' or 'IT-ready machines'.*

Conclusion

It is foreseeable that sensors will continue to play an important role across all manufacturing sectors and will remain a key component in all smart manufacturing facilities. Examples include the food and beverage where the devices will minimise the risk of hazardous or poor quality food products being sold for human consumption; the production of retail goods where sensors are used to monitor immediate environmental factors such as light, heat and moisture and in packaging facilities where quality control monitoring is enabled by leveraging specialist sensor technology. RFID will also continue to play a vital role in point-of-sale applications where individual product items are identified by barcode and RFID systems, while sensing technology applied in warehouses will allow inventories to be managed more efficiently. Automated stocktaking and reordering processes will optimise stockholding and could lead to an overall reduction providing bottom line savings.

Those companies that have already come to grips with the need to integrate IT and OT, and to embrace the role that sensing technology will play in manufacturing operations, will remain ahead of the curve as the Fourth Revolution takes hold on the world.

Gerry Bryant is the managing director of Countapulse Controls, southern African supplier of sensing, measurement, counting, switching, monitoring and positioning instrumentation. In operation for many years, the company has the full backing of its German principals and offers a complete technical advisory service for the most effective use of its products in automotive and other branches of engineering. Enquiries: Tel. 011 615 7556 or email Bryant@countapulse.co.za



Sensing solutions from Leuze will ensure that safety comes first in the workplace.