

CONCEPT Sensors enable machines to gather and interpret data in real-time. They are used to monitor various aspects of the manufacturing process, including temperature, pressure, vibration and other factors that affect quality and efficiency of production. The data gathered by sensors is used to optimize production, detect defects, and improve overall product quality. This allows manufacturers to detect potential issues before they occur, reducing downtime and increasing productivity.



TERMINOLOGY

PHYSICAL SENSORS - These are devices that measure physical parameters such as temperature, pressure, humidity, acceleration and vibration.

DATA ACQUISITION SYSTEMS - These systems are responsible for collecting data from sensors and converting it into a digital format that can be analyzed by computers and other devices.

CONTROL SYSTEMS - These systems use data from sensors to adjust the manufacturing process in real-time, ensuring that production is optimized for quality and efficiency.

WIRELESS COMMUNICATION - Many sensors used in advanced manufacturing are wireless, allowing them to communicate with other devices without the need for physical connections.

INTERNET OF THINGS (IOT) PLATFORMS - IoT platforms enable the integration of sensors and other devices with cloud-based applications and analytics tools, providing real-time insights.

MACHINE LEARNING ALGORITHMS - Algorithms can be used to analyze data from sensors and identify patterns and trends that can be used to optimize production and improve quality.

BACKGROUND

Make sure it measures up

Sensors have been used in manufacturing for decades, and their history can be traced back to the mid-20th century. The first sensors were developed for military and aerospace applications, where they were used to monitor various physical parameters such as temperature, pressure, and acceleration. As manufacturing processes became more automated, sensors were increasingly used to monitor and control production processes, leading to significant improvements in efficiency and quality. In recent years, the development of wireless communication and IoT platforms has led to the widespread adoption of sensors, allowing manufacturers to collect and analyze vast amounts of data in real-time. Today, sensors play a critical role in optimizing the manufacturing process, reducing costs, and improving the quality of products.

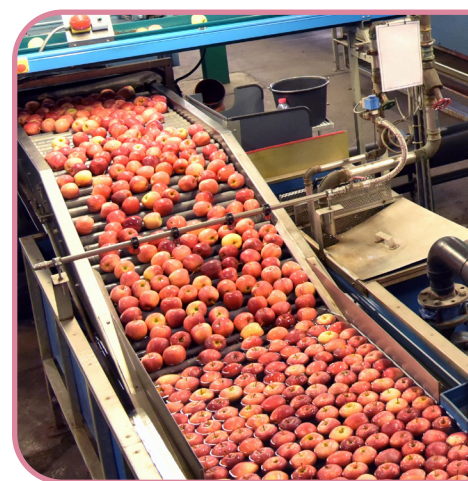
REAL WORLD CONNECTIONS

Nebraska is a major producer of beef and other meat products, and many of the state's food processing plants rely on temperature sensors to ensure that products are cooked and stored at the correct temperatures. For example, in a meat processing plant, temperature sensors may be used to monitor the temperature of the meat as it moves through the various stages of processing, from slaughter to packaging. If the temperature falls outside of the acceptable range, the sensors can trigger an alarm or send a notification to plant operators, allowing them to take corrective action before the meat is contaminated or spoiled.

Similarly, temperature sensors may be used to monitor the temperature of storage areas, such as freezers and refrigerators, to ensure that products are stored at the correct temperature to maintain quality and safety. These sensors can also help to optimize energy usage by adjusting temperature settings based on the amount of product being stored and other factors.

APPLICATION

One example of sensors is their use in predictive maintenance in the automotive industry. Predictive maintenance involves using real-time data from sensors to identify potential problems with machines or equipment before they lead to failures or downtime. These sensors are used to monitor aspects of the manufacturing process, such as the performance of robotic arms, conveyor belts and other machines. By analyzing this data, manufacturers can identify patterns and anomalies that may indicate impending equipment failure allowing operators to schedule maintenance or repairs proactively. Sensors advanced over time, which helps manufacturers optimize their operations, reduce costs and improve the quality and reliability of their products.



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