Automation Alley®

CASE STUDY: Next-Gen Production Line Traceability Solutions

OMRON

Omron Helps Veoneer Brake Systems Design Comprehensive Strategy for Visibility into Data

Problem

Veoneer Brake Systems LLC aspires to become a leader for the automotive industry's future brake control and actuation systems as autonomous driving becomes more widespread. The Stockholm, Sweden-based company designs, develops and manufactures products and safety electronics hardware, software and system solutions for active safety, autonomous driving, occupant protection and brake control. It has more than 9,200 employees in 13 countries with sales in 2018 of $2.2 billion.

As a new technology company that is building on a heritage of close to 70 years of automotive safety development, Veoneer strives to create trust in mobility. The company approached Omron with the goal of implementing a complete, end-to-end automation solution that produces next-generation braking systems.

Solution

The solution was to create a robust, real-time traceability system to support the high level of quality control required for such a critical product. Veoneer's traceability system supports comprehensive pre-screening of suppliers to prevent flawed components from being incorporated into the braking systems and thereby ensures customer safety.

Traceability is also an essential strategy for collecting and analyzing process data and keeping a record on all work-in-progress (WIP) status updates. By having clear and comprehensive visibility into all relevant process data, the company will be able to fine-tune their operations and get the new braking system up and running more quickly.

For each process within the overall production system, Omron and Veoneer needed to decide what level of traceability is required and what specific data must be collected. Since the company's new braking system is a complex technology that will interact with many other systems that make up an automobile, multiple components needed to be meticulously tracked.

Each aspect of the traceability system presented specific challenges, such as determining the optimal way to capture specific data and the best method for communicating that data to the enterprise system. Omron and Veoneer needed to work closely to figure out which aspects of a given work-in-progress would require tracking and visualization at each step of the way and choose the best way to transfer all the data in an efficient manner.

An additional challenge presented to Veoneer required selecting specific technologies in order

This case study originally appeared in Automation Alley's 2020 Technology in Industry Report

to ensure proper data would be available. Omron assisted in defining this important aspect of the project in order to make technology choices that could deliver the data Veoneer wanted and needed to collect.

Implementation

Omron and Veoneer planned for traceability from the concept stage and kick-started the process by creating a complete value-stream map and identifying critical information at each step. This information was sorted into three major categories: part-related, equipment-related and process-related. Most people think of traceability as dealing primarily with part data, but it happens to be just as important to keep tabs on equipment and overall processes. In fact, even a fourth category of environmental information—such as the amount of air particulate matter—could be added to the list.

As the two companies meticulously mapped out the data that would be critical at each step, they visualized part traceability as consisting of four levels. In the first level, each item is tracked individually. The second level deals with the lot or batch data, which for the application at hand means tracking lot/batch quantities of certain components. The third level—also dubbed 2 Prime or 2 Plus—involves trays of parts and part feeding systems, which require a complete clean-out before the next batch can be processed. The final level consists of verifying the correct part number for commercial off-the-shelf (COTS) items, including clips, fasteners and steel balls in large batches.

The resulting traceability maps were exquisitely complex. For each of the four categories—part-related, equipment-related, process-related and environment-related—multiple types of data must be collected. For each part, Veoneer planned to record the part number, serial number, production date, test results and measurement data. Equipment-related traceability data includes cycles on a particular tool, cycles on a pneumatic cylinder, diagnostic information for robots, and the like. Process data ranges from air and electricity usage to press curve data for each press operation, while environmental data primarily tracks the air particulate matter and ambient conditions.

Ultimately, the traceability system's architecture can be described by the acronym "MVRC," a conceptualization of the overarching traceability strategy that stands for "Mark, Verify, Read and Communicate." Direct part marking is accomplished using an Omron laser marker, while Omron's verification systems thoroughly analyze the quality of each marking produced. Barcode imagers from Omron's popular MicroHAWK line are responsible for reading the codes, and the traceability data collected from the production line is communicated to the rest of the system using a selection of networks and databases.

For networking and connectivity, the system has a total of three separate networks: EtherNet/IP for the information layer, EtherCAT for the control layer, and IO-Link for the device layer. The goal was to implement a scalable solution that would efficiently communicate all the necessary data to the enterprise. Database connectivity for the controls themselves makes it easy to transfer information to the higher-level systems. Veoneer uses Omron's NX controllers, and for each part going through the system, the company stores a certain amount of data specific to that part.

Outcomes

An examination of the overall traceability project offers a few key takeaways for traceability system planning in general. First off, it is important to thoroughly identify process points. This ensures that the most important data will get captured at each step of the way.

Veoneer's new traceability system has already made improvements in the overall design and implementation of the production line. In particular, the collection of strategic data helps indicate which areas of the line are responsible for bottlenecks, so that these can be improved upon well before the line actually needs to start producing braking systems for the market.

About Automation Alley

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