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OMRON Automotive Electronics Italy

Real time data monitoring ensures defect-free relays

How can data help reduce costs in the automotive industry?

OMRON Automotive Electronics Italy has upgraded its production line of Power and G8HN relays for the automotive market. The project, led by OMRON's i-BELT Data Services team, has helped OMRON A.E.I. attain a quality gate of 100% on assembled parts, reducing costs associated with waste and additional checks, with a return on investment achieved after just one year.

The high quality standards in the automotive industry require increased focus on efficiency and process repeatability when selecting the right technologies in production of components for the industry. This is what led OMRON Automotive Electronics Italy (A.E.I.), a company that produces around 30 million parts for the global automotive market each year, to revise its manufacturing strategies using data analysis as a tool for smart, real-time management of critical process-based defects.

The first step of this strategic overhaul was to upgrade the **Power and G8HN relays** production line, an initiative supported by **i-BELT Data Services**, a technology service provided by OMRON's Industrial Automation Business (IAB) division for everything relating to data acquisition and processing on board the machine.

Measuring the forces at play

The primary objective behind OMRON A.E.I.'s decision to upgrade its relay production line was to stamp out **any inefficiencies that could result in batch defects** and consequently cause financial losses and increase the risk of faulty parts reaching the customer. With support from OMRON IAB's i-BELT Data Services, OMRON A.E.I. developed a new quality-control model, which is no longer based on subjective intervention by downstream operators. Instead, the model is built on **real-time analysis** guided by intelligent systems able to eliminate any human error and faulty parts reaching the customer.

The engineers who worked on the project focused on the mechanical coupling of the plastic and metal components that make up the relays, known as **caulking**. This is the most critical part of the assembly process and is often the cause of faulty parts being supplied to the customer.

In the past, the qualitative check during this delicate stage of the process used to be performed by the operator, who carried out visual inspections based on statistics outlined in control plans to verify the correct appearance of a given component profile. However, this process didn't allow for faulty components to be recovered. Instead, if defects were identified, production batches would be quarantined, checked a second time—costing both time and money— and would often then be scrapped.
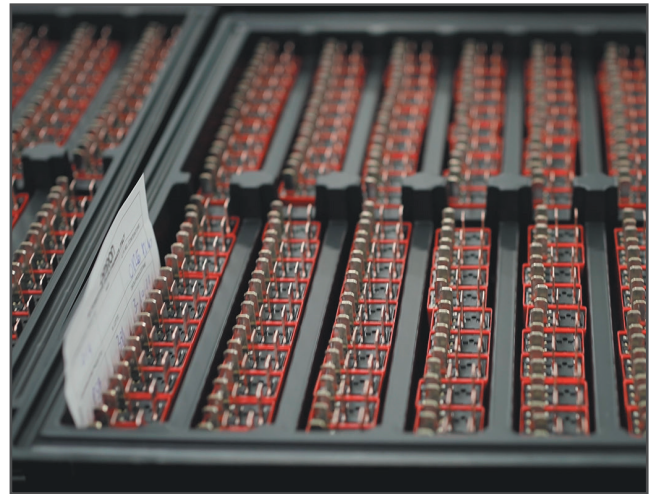
OMRON A.E.I. therefore decided to devise and implement **a new control system based on measuring the caulking force in real time**. The upgrade—made possible thanks to **OMRON AI NY controllers** and components integrated within existing processes and interfaced with force sensors installed on the line—allowed OMRON A.E.I. to achieve **a quality gate of 100%** and establish a threshold to enable problems to be "frozen" as and when they occur. Therefore, in the event of coupling defects, the process stops instantly to allow operators to quickly find the best solution.

A process driven by data

The goal, with help from i-BELT Data Services, was **to integrate the OMRON AI controller and the NY controller** within the process to achieve the required quality threshold, store data during production and ensure part traceability.

Data analysis proved critical to achieving all the targets set in the preliminary phase. The OMRON i-BELT Data Services team based in the Netherlands gathered every piece of data
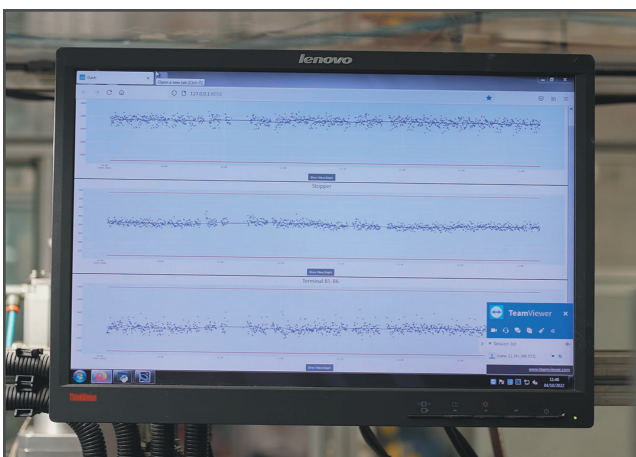
remotely from the sensors, including both those already installed on the machine and those fitted ad hoc to help monitor critical processes. This included **the force sensor located on the caulking head**, which was required specifically to measure the force exerted on the coupling.

Having the load cell connected to the AI controller allows OMRON A.E.I. to detect the different profile of the forces at play in real time, as well as determine the level and value of the force capable of ensuring a quality gate of 100%. One of the biggest advantages of the AI controller is that it can synchronize with the machine and intercept data with **millisecond precision**.

This means that the AI controller can detect irregularities very accurately as well as give immediate feedback. The result is an incredibly detailed view of the process: *"We know exactly what's going on inside the machine,"* explain the engineers at OMRON A.E.I. *"Just as a doctor that examines*

a patient, the controller allows us to detect the force profiles at play and the actions to take in order to resolve a problem."

Controlled quality equals reduced costs

By using the very best Industry 4.0 and AI technologies from the i-BELT Data Services team based on process monitoring, analysis, verification and validation, OMRON A.E.I. achieved every one of its goals during the assessment phase. Above all, OMRON A.E.I. attained a **quality gate of 100% on assembled parts**, which is a must in the automotive industry. This also enabled the Frosinone site to eliminate all costs associated with additional batch checks and wastage, with a return on investment achieved in less than 12 months.

Furthermore, in terms of big data, A.E.I. is now able to store all of the measurements within a database and reprocess them at any time. Going forward, managers at the company say the plan is for the same method to be extended to other products based on similar processes.
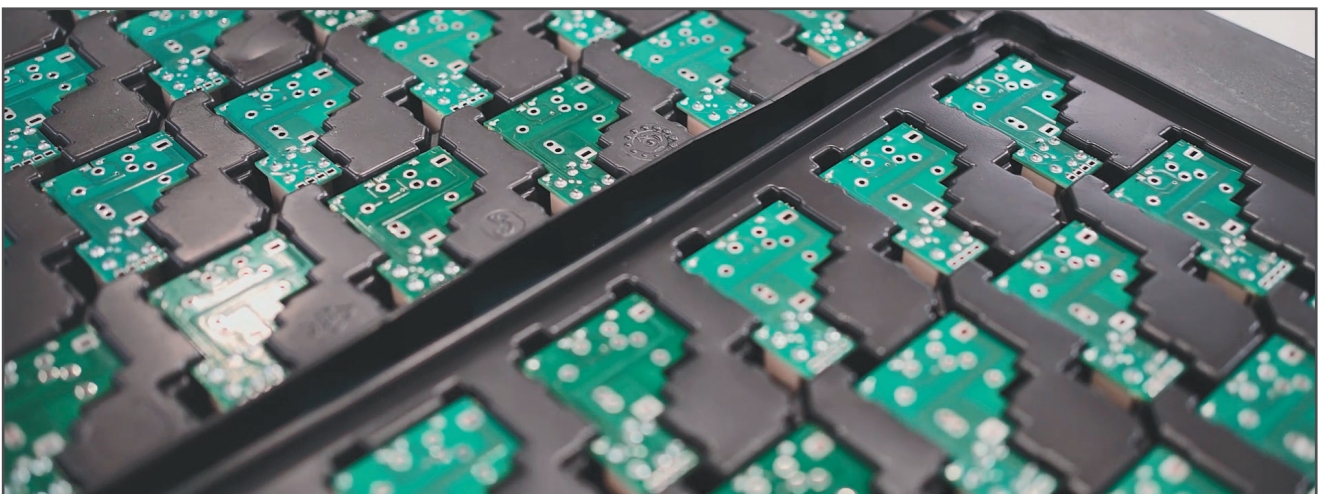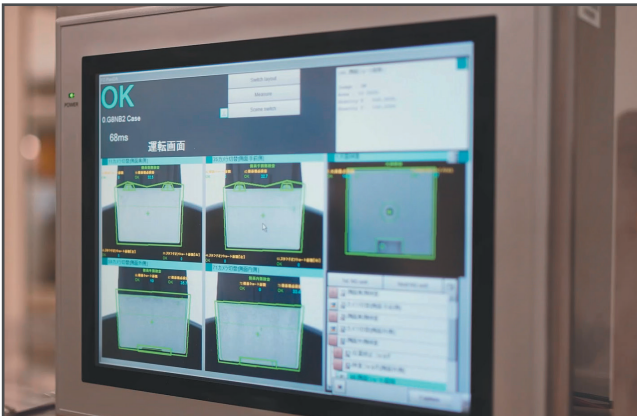
Finally, it's also worth highlighting the **sustainable** benefits that come with the upgrade, including **reduced energy consumption** (electricity, water, gas), **shorter working times** and use of scrap parts and noble metals (copper, silver, brass).

According to managers at OMRON A.E.I., these results are fully in line with OMRON's green vision and serve as an example for all companies seeking to **improve their own manufacturing processes by focusing on data analysis rather than more costly investments in new hardware infrastructure**.

About OMRON Automotive Electronics Italy

As part of the OMRON DMS (Device & Module Solutions) business, A.E.I. is the only OMRON automotive manufacturing site in Italy and Europe. Specializing in relay and module manufacturing, A.E.I. covers a range of areas including design, product development, production of plastic and metal parts through to the final product, design and automation of process equipment (assembly and testing), sales, customer service, warehousing and logistics. Originally founded in 2004 at the Alatri site in Italy, A.E.I. moved to its new location of Frosinone in 2018. With around 150 employees, the site meets the demand of major car makers in North Africa and Europe.

OMRON i-BELT Data Services

OMRON i-BELT Data Services is a service where OMRON and its customers collaborate to capture production-line data and transform it into meaningful information and practical enhancements. Using a step-by-step approach, Data Services engineers support businesses in their journey toward digital transformation, ensuring the efficiency of their lines, reducing machine downtime and monetizing manufacturing data. For more information, visit https://industrial.omron.eu/en/services-support/data-science-services

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About OMRON

OMRON Corporation is a world leader in the field of automation, operating in sectors ranging from industrial automation, automotive components, electronics and mechanical components to healthcare, social systems, solutions and services. Founded in 1933, OMRON has around 39,000 employees worldwide, working to provide products and services in more than 110 different countries. OMRON is dedicated to improving the well-being of society by offering technologies that stimulate innovation in areas such as manufacturing, products and customer service. For more information, visit https://industrial.omron.eu/