Case Study

Automated particle monitoring in mobile cleanrooms

GlanAir

Project: Particle monitoring in ISO 14644-1 classified mobile cleanrooms

Location: Lester Prairie, Minnesota, U.S.

Parameters: PM (0.5µm, 1µm and 5µm), differential pressure, temperature, humidity

Lester Prairie site

Background

Liquibox designs and manufactures premium-quality fluid management and transfer solutions for a global customer base. As part of a capacity expansion for clean-moulded products in their Lester Prairie plant, the Engineering team developed a modular cleanroom solution around their plastic injection moulding presses.

The Challenge

Critical to quality risk management is the operation of a Class 8 cleanroom and 23 ISO 14644-1 classified modular cleanrooms (MCRs) which includes maintaining low particle counts. Data from periodic sampling was considered insufficient to assess and manage contamination risk and the team had a clear vision for an automated system. Airborne contaminant specialists, NuWave Sensors were brought in to discuss the requirements.

Solution

The proposed solution was the GlanAir CEMS (Controlled Environment Monitoring System). The system comprises wireless sensor devices connected to NuWave's proprietary HEX platform and integrated with the host SCADA system.

Each MCR enclosure was fitted with a GlanAir TD40 (particle, temperature ad humidity monitor) and a GlanAir DP100 (differential pressure) with a sampling frequency of 1-minute.

Customer Experience

The CEMS is fully automated requiring no manual operation from the production team. In the event of a contamination threat in one of the enclosures, such as high particle count or drop in differential pressure, an email alert is provided via the SCADA system and a dashboard is immediately updated, enabling fast remedial action. Response protocols include enclosure inspection, HEPA fan operation check and door closure checks.

Live data for all 23 MCRs is presented on the SCADA dashboard. The dashboard also hosts a repository of historical data. Particles are categorised into 24 software bins ranging from 0.35µm to 40µm for detailed analysis of particle distribution, concentration and density. The granular data provides the team with the ability to characterise potential contamination threats and investigate any performance drift.

> The NuWave GlanAir CEMS solution has enabled us to automate particle monitoring in our cleanroom and modular cleanroom enclosures, which is critical for us to ensure cleanroom integrity and ISO compliance. We especially value the automated alerts and speed of response, allowing us to quickly identify, correct, and record corrective actions related to particulate contamination.
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> ***Jim Koski - Manager, Fitments NPD & Automation Engineering***

Outcomes

- The system provides 24-7 verification that conditions are maintained within acceptable ranges.
- Following process refinements, typical alarm frequency has been reduced to just 1-2 alarms per week across all 23 MCRs.
- In return for minimal investment, deployment of the CEMS has transformed management of contamination risk to provide the highest quality assurance for Liquibox's customers.