Counting on Annex 1

Innovation in computerised distributed monitoring systems now enables pharmaceutical companies to meet the challenges of revisions to Annex 1 of the EU Guide to Good Manufacturing Practice, without punitive costs.

Revisions to Annex 1 of the EU Guide to Good Manufacturing Practice has created new challenges for particle counting, leading to the introduction of widespread continuous monitoring using larger sample volumes.

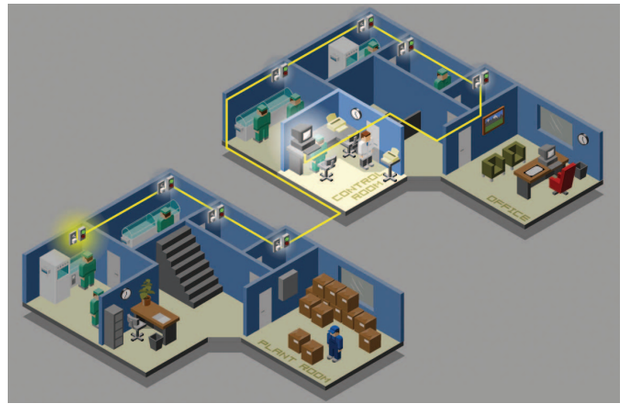
Historically, manifold systems have been used extensively for particle counting, where a central particle counter sampled air sequentially from many locations. This allowed savings to be made since a single counter and pump could be shared among many sample locations, with critical areas being monitored using portable counters that moved between operations. These traditional approaches came at a price; with the manifold systems, particle loss (particularly at 5µ sizes) became significant when long tubing runs were used. Of course, these particles were not 'lost', but had merely settled in the tube, from where they could be disturbed by vibration at a later date and appear as a spurious high count during production. Even the portable counter had its drawbacks as it relied on paper printouts as evidence of compliance during each stage in the process. These had to be manually annotated, collated and attached to the batch report after the process was complete.

Continuous monitoring

The emergence of distributed input/output systems that can be 'daisy-chained' from a central PC enables a network of continuous monitoring particle counters to be implemented at reasonable cost. A small counter housed in a stainless steel outstation can be mounted close to the point of measurement – in a laminar flow, for example. This outstation is supplied with power, vacuum from a nearby pump and a single 'multi-drop' communications link back to the PC to return particle counts together with control and status signals. The outstation contains all the electronics necessary to control the local vacuum pump, sense the vacuum levels and provide local indication of equipment 'running' and 'fault' status.

A stitch in time

It is vital that operators working in a cleanroom are made aware as soon as possible that the process may have become non-compliant. This allows the process to be interrupted and corrective action to be taken to minimise loss of production. The revised Annex 1, however, calls for total sample volumes of $1m^3$ to be used. With standard particle counters running at $1ft^3$/min ($0.028m^3$/min), this would take more than 30 minutes to achieve, longer than many operations themselves. A 'walking window' technique applied to individual particle counts for each cubic foot enables early detection of out-of-compliance values. Operators can then be alerted via local 'alarm panels' that show red and green lamps as an indication of out-of-compliance results, or a text display clearly indicating the source of the problem. The important issue here is that only relevant *local* parameters are shown. The alarm panels themselves can also be multi-dropped on a single communications cable to facilitate easy installation.



Innovation in computerised distributed monitoring systems makes continuous monitoring easier

This can all be managed by a 21 CFR-compliant PC system that displays, stores and retrieves the particle counts and other parameters such as temperature, relative humidity and differential pressure as required. Innovative solutions such as these help facilitate maximum good manufacturing practice (GMP) compliance with minimum production downtime. ■

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