

# CASE STUDY

## CLEAN ROOM CONTROLS KEEP UP THE PRESSURE

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London's internationally renowned Moorfields Eye Hospital will shortly be opening a state-of-the-art unit for the manufacture of special ophthalmic products. Helping to maintain sterile conditions inside this highly automated, continuously operating facility is a Trend building management system. As well as exercising tight control of the unit's environment, the system closely monitors room pressure levels and other key variables and constantly checks the status of process-critical plant. Crucially, it will warn of potential problems that might disrupt production.

Built by AMEC Capital Projects, the new pharmaceutical manufacturing unit (PMU) provides Moorfields Eye Hospital NHS Trust with a much larger and more modern facility for producing sterile ophthalmic products. These will be used within Moorfields itself, as well as by hospitals elsewhere and other authorised users such as high street pharmacies. The facility will be the first within the NHS to employ automated 'blow-fill-seal' technology (for making unit dose ampoules).

The PMU occupies the ground and basement floors of a new building close to the hospital's main site. The actual manufacturing facility is in the lower basement and is laid out in three concentric zones with differing air cleanliness requirements. Clean room conditions apply in the inner and

middle zones, those in the centre being the more stringent. The outer zone, which includes a QA laboratory and packaging materials store, is a non-sterile environment. The different zones thus have to be pressurised relative to one another and to the lift lobby, which is the only unpressurised area.

A pair of large air handling units provide conditioned air to constant volume terminal boxes in the ceilings of the various areas. Each clean room has both a supply and extract box, whereas non-sterile areas have only a supply. The BMS controls the main AHUs to deliver air at the desired temperature and humidity and varies the speed of their fans to maintain constant duct pressures (800Pa supply, 600Pa extract). It also provides the terminal units with their air-flow control set point.

On each of the supply boxes it controls a heater battery to achieve the required space temperature.

Some rooms and equipment have auxiliary extracts. When one is automatically or manually switched on or off, or its speed adjusted, the system changes the setpoint for the local extract box, thus ensuring that the total air volume removed remains the same. In the QA lab, which has a fume cupboard extract, it responds to changes to the latter's speed by altering the supply air-flow setpoint.

If the air-flow from any of the terminal units were to deviate from its setpoint by 3% for more than 60 seconds the BMS would generate an alarm. It will also do so when a unit's damper reaches 95% open, which would indicate that its HEPA filter needs



changing. Other alarm conditions include out-of-tolerance space temperature, RH and – most crucial of all – differential pressures. If clean rooms are not kept positively pressurised relative to non or less sterile areas, costly loss of production could result.

Alarms will be displayed on the system's main operator interface - a Trend 962 supervisor. Critical alarms are accompanied by an audible warning. These not only relate to room pressure levels, but also include fault conditions on air compressors and a water/steam purification plant – both of which are vital to the manufacturing process - and low pressure on tanks supplying nitrogen to the blow-fill-seal machine's charging vessels. By providing a central point of access to a wide range of monitored data and alarm conditions, the 962 will enable a small engineering team to manage all the site's services and equipment.

Control and monitoring functions are performed by network-linked Trend IQ outstations. Three large IQ251s take care of the main AHUs, chillers, boilers, radiator circuits and several secondary chilled water circuits serving the process plant. IQ222's were mainly used on the terminal boxes, one outstation controlling both the supply and extract for a room and monitoring its environment. Where supply and extract are not close to one another, or where there is only a supply box, each unit has a dedicated outstation – generally an IQ211.

Trend can be contacted on 01403 226451

## 2006 Update

Moorfields Eye Hospital, City Road is still controlled by a Trend Building Management System.

In line with our commitment to 'future proof', the supervisor has been upgraded to a 963 from 962, and using an EINC, the Moorfields Engineer can now also monitor and control an additional site within the Moorfields group of hospitals, namely St Ann's, Tottenham.

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