

Chemicals Producer Installs Siemens Analysers to Ensure Plant Safety

Safety is always a priority within the demanding environment of chemical and pharmaceutical manufacturing. As part of a major project to install additional atmospheric sample points across AGC Chemicals Europe's (AGCCE) UK plant in Lancashire, the existing chromatographs needed to be replaced. Siemens analysers were specified for their reliability, user-friendliness and low cost of operation and ownership.

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AGCCE uses gas chromatographs (GCs) for monitoring air quality in both its polytetrafluoroethylene (PTFE) and ethylene tetrafluoroethylene (ETFE) plants. The two existing ones in the PTFE plant which manufactures fluoropolymer resins and dispersions required upgrading to communicate with the DCS via Ethernet and to comply with DSEAR explosion hazard and risk assessment recommendations.

AGCCE uses flame ionisation detectors (FIDs) measuring in parts per million (ppm). The atmospheric monitors selected for the plant were Siemens Optichrom Ax5, Ax7, and Ax8 with an upgraded Advance Plus door, in addition to the Ax10 which is currently being upgraded.

Networked analyser system

With the GCs installed onto the new network, information - including details of detected gas levels, analyser status, current group/stream being sampled, time and date of the sample - are sent from them to the DCS where it is displayed on the appropriate menu screen.

An advantage with the primary Optichrom Advance Electronics Controller (door assembly) from Siemens is that it can be replaced at any time with the latest generation and compatible Maxum II analyser. Performing chemical composition analysis of gases present in all phases of production, the use of plug and play electronic hardware and industry standard network and communications tools together with its ability to accomplish different measuring tasks, makes it easy to use and offers low ownership and operational costs.

“We refer to the Ax10 as the ‘chronic’ analyser because it has 30 streams that monitor the plant stream by stream,” explains Andy Lord, instrument/electrical project engineer at AGCCE. “It datalogs to a standalone PC, providing background levels of any gases found; all the historical data is then recorded on the LAN network.”

A very important criterion was that the system would be able to analyse toxic chemicals in the atmosphere as quickly as possible to ensure operator safety.

The ability for the GCs to offer a broad range of analytical possibilities was a further key requirement. The plant requires tetrafluoroethylene (TFE) to produce the final products; PTFE and ETFE. TFE is one of the main components detectable by the Siemens analysers along with hexafluoropropylene (HFP) and isceon 22 (R22). Ax5, 7 and 8 look for TFE and HFP while Ax10 looks for all three.

“We had to change the capability of the Ax5 analyser by altering the detector column to facilitate the detection of TFE due both to location and duty of the new sample points,” explains Lord. “We also replaced the existing sampling system to facilitate an additional five sample points and three spares for future requirements. The additional sample points made it necessary to group the streams around the compound to keep cycle times down.”

Single stream analysis of the high boilers compound for HFP is carried out by Ax5, alarming on detection of intermediate and high levels, publishing the results to a printer and indicating a fault condition alarm on the control gallery.

The Ax7 and Ax8 analysers act as the PTFE plant ‘sniffers’ with a cycle time of approximately 62 seconds per group. AGCCE has utilised existing spare sample points on each analyser to facilitate the requirement within the distillation section along with the relocation of one existing sample point (Ax7).



Alarm system

In the event of toxic gas being detected a flashing beacon and hooter are activated, warning personnel to immediately evacuate the plant. The system then checks each area for high levels of gas to pinpoint the leak.

On detecting high gas concentration, Ax7 is programmed to go into single stream analysis to source the leak. Ax8 is set to stay in group mode regardless of any leak detected by itself or Ax7. In addition, when either intermediate or high alarm levels are reached the analyser will activate a digital output which then activates the relevant plant warning beacons via the Omron PLC.

TV monitors are positioned around the plant to display results in a ‘traffic light’ format. Clearly visible, personnel are always aware of the current status of the air quality.

The PLC forms part of a warning system to drive plant warning beacons on receipt of alarm signals from Ax5, 7 and 8. This provides an independent system in the case of a DCS failure where the analysers are still monitoring the plant and providing plant beacon activation on gas detection, hence safety is not reliant upon the DCS alone. The PLC panel has been modified to include a new key switch to override input status information should Ax5, 7 or 8 have a fault that requires its shutdown, thus enabling the remaining analysers to control the plant evacuation beacons as normal. The DCS provides real time and historical data, alarm logs and trends. Should the PLC experience a fault, the signal is sent to the DCS along with the existing signal to the control gallery annunciation panel.

The control gallery (red/yellow) beacons activate when any predetermined alarm set value is reached; the operator may cancel these by the on-screen reset button. Once analysers Ax5, Ax7 or Ax8 have generated an alarm which has activated the plant warning beacons, the PLC ‘latches’ the beacons in alarm condition. When alarm levels/status have returned to normal the analysers auto reset the alarm signal to the PLC; the plant operator may then initiate the PLC reset signal via the on-screen reset button. Similarly, HIS station audible alarms will activate and be mutable via the HIS station accept button.

“As a result of the superior performance of the Siemens atmospheric analysers we have gone from daily calibration checks to weekly,” concludes Lord. “This is because the GCs regularly pick up trace values during daily operation that are unavoidable so we know they are working efficiently.”

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