

Electronic dp improves accuracy, installation and maintenance

New technology solves problems for Lucite International



Lucite International is a global leader in the design, development and manufacture of acrylic-based products. Since being acquired by Mitsubishi Rayon Group in 2009 the company has further strengthened its position as the world's largest supplier of methyl methacrylate (MMA), the essential building block for all acrylics. Lucite International has one of the most diverse asset portfolios of any major acrylics producer with 22 plants at 14 manufacturing sites worldwide.

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Tony Kydonakis
I/E Asset Engineer
Lucite International



Tony Kydonakis, I/E Asset Engineer at Lucite International's Cassel Works.



The challenge The engineers at Lucite International's Cassel Works in Billingham wanted a better way of measuring the level in a separator vessel. The vessel keeps the chemical BPA under vacuum and at high temperature in order to separate off the volatile organics and reuse them, improving yield and plant efficiency. It's important that the BPA itself doesn't enter the downstream process due to its viscosity and high sulfuric acid content, which carries a risk of corrosion.

The existing level monitoring system in the vessel was a high level alarm and trip, which had the desired effect of preventing overflow but gave no pre-warning of any problems. The obvious solution was to install a differential pressure device – mounting sensors at the top and bottom of the vessel in place of existing sight glasses – in order to monitor the level more closely. Yet there were concerns over accuracy and speed of response with a traditional differential pressure measurement system using oil-filled capillaries. Due to the height of the vessel, capillaries

of up to 10 metres in length would have been needed. Changes in the ambient temperature would have affected the volume of the oil in the long capillaries, potentially reducing the measurement accuracy. Installation of a traditional device would also have been difficult as it would have required feeding the capillaries through the floor of the plant in order to mount the transmitters at the top and bottom of the vessel, using the existing tapping points. There were also maintenance considerations, as Lucite's I/E Asset Engineer, Tony Kydonakis explains: "If a diaphragm seal fails we would have to erect a very large scaffold to remove the complete assembly. The process would stop for the duration of the repair thereby incurring significant efficiency losses to the business."

The solution It was decided to install Endress+Hauser's electronic differential pressure system, Deltabar FMD72. Electronic dp is up to ten times more reliable and up to ten times faster in response times than traditional capillary systems, as it is independent of changing ambient

conditions. Unlike other electronic dp systems, Deltabar FMD72 consists of just one transmitter, instead of two, and two sensor modules. Either sensor can be operated as the high or low pressure sensor. Due to the acidity of the BPA in the vessel, the device was supplied with tantalum diaphragm seals to avoid corrosion. Endress+Hauser also supplied Lucite International with a HART splitter, enabling them to measure the vapour pressure at the top of the vessel as an additional parameter. Additionally, Lucite purchased the Endress+Hauser Start-Up package, which includes commissioning of the instrument by a qualified Service Engineer as well as 12 months' extended warranty and six months' on-site support. "We saw it as free training for a new technology," laughs Tony Kydonakis. "We were able to sit with the engineer when he came to do the commissioning and ask any questions."

The benefits Ease of installation was a big benefit for Lucite International. The system's modular design means that the transmitter, sensors and cable are mounted separately, avoiding having to feed metres of cumbersome capillaries with attached flanges between floors or modify the vessel. It also means that individual components can be replaced separately. "Because the top and bottom sensors are the same, you can keep just one sensor in stores so if it goes wrong for whatever reason you can just quickly replace it," explains Tony Kydonakis. "It's better than having to send the complete capillary system off site for repair or keeping an expensive capillary system in stores." Due to automatic sensor recognition there's no need for recommissioning or recalibration once a sensor is replaced. The FMD72 also uses a standard cable, reducing maintenance and repair costs.

The FMD72 also proved to be more cost-effective in terms of capital expenditure. "The Endress+Hauser device was cheaper than a competitor's electronic dp system because it uses just one ATEX certified transmitter module instead of two," says Tony Kydonakis. The company has also benefited by being able to mount the single transmitter in a convenient location for the technician.

Electronic dp has proved to be a good solution to a difficult application in more ways than one. As Tony Kydonakis explains, "I chose electronic dp because of its accuracy in measurement and reliability, as well as the benefits of easy installation and maintenance. It's a lot speedier to respond than capillaries and being able to give the process engineer a vapour pressure measurement is a bonus. It's actually very accurate and we haven't had any problems with build-up on the sensor – the last time I checked it was still nice and clean."

The trial has proved so successful that a second FMD72 is being considered for the site to replace an existing capillary system.



Bottom sensor and separate transmitter.

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