Fast Response and Continuous Gas Analysis Reduce Emissions and Enhance Raw Materials Recovery

RESULTS

- Reduction in the consumption of costly raw materials
- Elimination of regulatory fines by reducing acetone emissions from 1000ppm to 300ppm
- Savings of $5M per year through carryover gas consumption
- Elimination of plant shutdowns that had previously cost $10M

An unreliable gas analysis system led to costly shutdowns. Continuous gas analysis allowed the plant to track the recovery rate of the adsorber accurately and reliably, reduce emissions substantially, and save a significant amount of money.

APPLICATION

Chemical manufacturing

CUSTOMER

Major chemical manufacturer in Latin America

CHALLENGE

A major manufacturer of cellulose acetate in Latin America was faced with an environmental emissions problem. The company's product is derived from natural sources and is, in itself, environmentally friendly. However, the recovery of acetone during the fiber production process is critical. It is done by passing the process mixture along an activated carbon bed that is meant to adsorb most of the acetone and avoid releasing it to the atmosphere. Optimizing acetone adsorption is critical not only for assuring compliant emissions, but also for reduction of raw material and energy use since the acetone is recovered to be reused in the process. In order to assure optimum adsorption, variables such as adsorption time and steam flow must be adjusted. Reliable and accurate gas analysis is essential to performing these adjustments.

Unfortunately, the 15-minute response time of the gas analysis system they had been using was so slow that the acetone filters became clogged and prompted shutdowns. The unit eventually failed five times, shutting down the process and inflicting a staggering $10 million cost.

The unit's lack of reliability precluded any further attempt at repairs and, as a result, the company moved to manual sampling — requiring an operator to take samples to the laboratory every 48 hours for analysis. This interim solution was based on a "best guess" of the time it would take for the acetone filters to become clogged. If the guess was wrong, not only would costly raw materials be lost, but the chances for a release of acetone into the environment could risk fines as well as environmental damage. Manual sampling was inexact, personnel intensive, and wasted raw materials.

Rosemount X-STREAM Enhanced XEGP Continuous Gas Analyzer.

EMERSON

SOLUTION

The company policy established an acetone emissions analyzer as critical equipment into their "Environmental Critical Equipment List." To avoid a major Reportable Quantity (RQ) of acetone emissions, the decision was made to install a continuous gas analyzer with photometric detectors – the Rosemount™ X-STREAM *Enhanced* XEGP. The analyzer monitors stack loss and sends the data to a DCS to detect high acetone emission concentrations so that the operator can adjust the adsorption time, steam flow, or even take the equipment out of service to avoid an RQ on the process. The analyzer has a standard response time of 4 s ≤ t90 ≤ 7 s depending on the integrated photometer bench.

The company decided to perform continuous measurement of acetone concentration at the exhaust line using the Rosemount X-STREAM *Enhanced* gas analyzer. The process that had been conducted manually involved feeding the gas stream via one of the adsorbers for a pre-determined time – the "estimated" saturation time of the adsorber. Once adsorber 1 became saturated, the gas stream was deviated to adsorber 2 while adsorber 1 was purged with steam. Once adsorber 2 got saturated, the gas went to adsorber 3 and continued the cycle. With the Rosemount X-STREAM *Enhanced* in operation, they were able to monitor the acetone content in the exhaust, allowing the customer to define optimal filtering and steam-cleaning cycles.

With the Rosemount X-STREAM *Enhanced* gas analyzer in operation, the acetone concentration was reduced from 1000ppm (as found) to 300ppm, significantly reducing acetone in the exhaust and increasing its recovery. Once the operator analyzed the results, it was noticeable that even with the same residence time and with the same amount of steam on each adsorber, the recovery rate was different. This drove the plant to define an optimal operation and cleaning time and cycle, reducing the amount of steam used for cleaning, and guaranteeing a continuous process. The technology of the Rosemount X-STREAM *Enhanced* XEGP Continuous Gas Analyzer gave the company the ability to track the recovery rate of the adsorber accurately and reliably, reduce emissions substantially, and save a significant amount of money.

RESOURCES

For more information about the Rosemount X-STREAM *Enhanced* XEGP Continuous Gas Analyzer, visit:

www.emerson.com/en-us/catalog/rosemount-xegp

00830-0400-6129, Rev AA

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