How a Fork Density Meter can easily replace a Nucleonic instrument in a chemical plant

RESULTS

- Optimization of nitric acid distillation column
- Elimination of radioactive sources across the plant
- 3,000 Euro per instrument saving for radioactive source replacement and disposal
- Increased density measurement stability
- No more dangerous manual sampling to check nitric acid concentration

APPLICATION

Measurement of nitric acid concentration.

CUSTOMER

A major chemical company located in North-West of Italy

CHALLENGE

A company in North-West of Italy owns six installations using nucleonic density meters, in acid water treatment and oxide recovery plants. For the treatment of acid water, input to the column has a concentration between 30% and 35% @ 55°C-60°C, whilst the output concentration should be fixed at 50% with a process temperature of 100°C.

The company noticed unstable measurements from nucleonic devices, and therefore had to periodically check the concentration in a laboratory and then adjust the nucleonic meter's calibration factors. Safety concerns during the sampling of nitric acid required the operators to wear heavy protective clothing during the manual sampling process. Due to the time consuming activity, sampling could not be done frequently and the meters therefore often showed anomalous results.

In addition, nucleonic meters were difficult to manage. The company first had to be recorded as a "nuclear company", and were required to have a dedicated space for the meters, have trained personnel specifically for the devices, and the management of radioactive material was also expensive and difficult. The radioactive source reduces its power over time, so it must be periodically changed, resulting in additional costs for disposal.

"Maintenance of nucleonic meters was dramatically expensive, and was giving problems. No more issues with Emerson FDM!"

Fork Density Meter, 2" pocket recessed installation at the chemical plant.

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To meet safety regulations, the company also had to pay an external company specialized in nuclear leakage to check the instruments once per year, looking for any possible safety issues.

The company was looking for a different technology to measure nitric acid concentration, aiming to have more accurate, reliable and stable measurements plus a reduction in the operating costs of the meters.

"Now my density measurement is realiable and stable. It's truly a "fit and forget" solution."

SOLUTION

Since the measurement was critical, Emerson was initially involved with a test on a single Fork Density Meter (FDM) built with Titanium forks.

Once optimum installation had been established, resulting from an accurate site survey made by local Emerson Service, the meter was installed in a T-piece. Startup was fully managed by Service, who provided a meter fully configured and ready to work and to deliver to the company successful results necessary for the trial test period.

After an initial phase of density measurement checks, all the manual sampling has been stopped since there was no offset between laboratory and on-line FDM measurements. Measurement stability was excellent, and as a result sampling is now made only on an occasional basis for validation purposes.
Thanks to the trial period, the company understood the value of the Emerson FDM technology, and was able to quantify the potential savings against nucleonic density meters: they no longer need all of the complex and expensive management of radioactive sources, no longer need to send an operator into the field for dangerous daily checks and, from a process point of view, the stability of the FDM is much higher than that realized by nucelonic meters.

The periodic checks of radioactive leakage are no longer required, resulting in additional savings. Further savings, evaluated to be around 3,000 Euro per instrument, are realized because there is no longer a need to replace radioactive sources with the associated disposal costs.

With Fork Density Meters, the company has optimized the nitric acid distillation process, and benefited from improvements in the quality of the final product.

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