Ink Producer Increases TNPT Production by 50 Batches Per Year with Micro Motion® ELITE® Meter

BENEFITS

- Produced 50 additional on-spec batches per year, worth US$1.25 Million
- Reduced production costs and waste of raw materials
- Saw a six-day payback period on the cost of installation

APPLICATION

A major ink producer in the United Kingdom makes Tetrabutyl Titanate (or TNPT) as an intermediate ingredient in the ink production process. TNPT is commonly added to increase the paint and ink pigment quality in adhering to a substrate. This additive is quite valuable when comparing it to the price of ink itself. TNPT is sold at US$50 per kilogram.

To produce the TNPT: alcohol, tetra compound, and a solvent are fed into the ink process reactor in precise mass ratios. Ammonia (NH_3) is added continuously throughout the production process until the end of the polymerization reaction. Adding ammonia alters the pH levels and halts the polymerization reaction via a sparge ring. The last few molecules of ammonia gas that are fed into the process are critical for producing TNPT, and must be added in precise amounts to neutralize the reaction at the appropriate time for each batch.

The ammonia fed at the end of the process runs at a flow rate of 0–4.4 lb/min (0–2 kg/min), 45–145 psig (3.1–10 bar) of pressure, and 104–176 °F (40–80 °C) of temperature.

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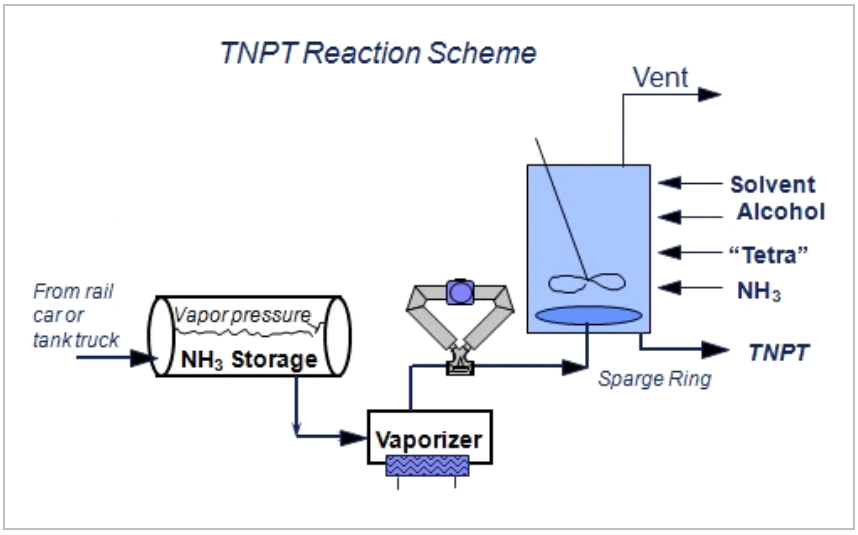

A process flow diagram illustrating the TNPT process

CHALLENGE

For traditional flowmeters to work well, the customer needs to be able to control a wide gas flow range and fluctuations in temperature and pressure. For the customer, mass measurement is preferable

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to the other measurements because they run a gas — of which volume and density can vary due to the fluctuations in temperature and pressure. The customer tried using thermal mass meters, but these meters could not produce sufficient accuracy for the process conditions. Thermal mass meters were only accurate to 10% under the range of the conditions, which was not precise enough to stop the polymerization reaction to produce TNPT effectively.

SOLUTION

The customer chose to install a Micro Motion® ELITE® meter in its TNPT production process to control the flow rate of ammonia gas. The ELITE meter can achieve as high as 0.35% accuracy over a wide flow range of gas. These meters are easy to install and do not require any run-pipe or conditioner prior to fluid flowing into the meter.

With the installation of the Coriolis meter, the customer saw the following benefits:

- Reduced costs on raw materials by minimizing the overage of raw materials fed into the TNPT reaction process
- Increased process efficiency by allowing them to increase their production capacity by 50 batches per year, which is worth US$1.25 million a year on a 500 kg-batch size basis
- Saw additional cost savings in not having to reheat the fluid due to low pressure drop that occurs when using other types of technologies.

Given these benefits, the customer was able to break even on the US$20,000 installation costs in 6 days, or what is equivalent to an additional batch of TNPT produced.

Location of the ELITE meter installation at the customer site

Emerson Process Management
Micro Motion Americas
Worldwide Headquarters
7070 Winchester Circle
Boulder, Colorado USA 80301
T: 800 522 6277
T: +1 (303) 527 5200
F: +1 (303) 530 8459

For a complete list of contact information and web sites, please visit: www.emersonprocess.com/home/contacts/global

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