Improved Profitability and Process Control at Polyester Plant with High Temperature Meter

RESULTS
• Increased profitability
• Improved product quality
• Improved control over the plant process

APPLICATION
As a key step in polyester fiber manufacturing, a small but precise amount of ester monomer must be added to the process. The amount of monomer that is added needs to be tightly monitored to keep the product within specifications and to ensure that the monomer, which is relatively expensive, is not wasted. Because ester monomer freezes at temperatures below 464°F (240°C), it must be added in at 500°F (260°C), when it is sure to be in liquid form.

CHALLENGE
The temperature at which the monomer is added renders many metering technologies ineffective. In the past, volumetric flowmeters have been unsuccessful in this application. Magnetic flowmeters have a maximum temperature limit of less than 400°F (200°C). Positive displacement meters have also performed poorly because of the effects of high temperature on their moving parts and seals.

Some manufacturers have tried using a level control system in the polymerization reactor to ration the production rates with the injection of additives. Level control systems have proved to be unreliable because the ester monomer tends to foam when agitated under a strong vacuum.

SOLUTION
Micro Motion® Coriolis flowmeters have a lengthy and successful track record in the fiber industry. Micro Motion offers a Coriolis flowmeter that is capable of withstanding fluid temperatures up to 662°F (350°C), which is a perfect fit for applications such as hot ester monomer.

The sensor is installed in a vertical orientation so it will self-drain, and
it is outfitted with an electrically-heated jacket to prevent material from freezing in the meter during plant downtime and upsets. Not only is the meter capable of withstanding the intense temperatures of the monomer injection process, but like other Micro Motion solutions, it delivers high accuracy, surpassing anything that was used before.

The mass flow signal from the monomer flowmeter provides a critical input to the ratio controller that adjusts additive flow rates, leading to reliable, accurate metering of the monomer entering the process. The accuracy ensures that the expensive material is not wasted and that the correct ratio is maintained in the finished product.

Accurate, automated measurement of high temperature processes such as ester monomer has historically been virtually impossible to achieve. The quality of the finished product and control over inventory were at the mercy of ill-suited solutions. Micro Motion high temperature Coriolis meters allow accurate measurement and control of hot process fluids. The flowmeters resulted in improved control over the plant process, improved product quality, and increased profitability.