Clamp-on ultrasonic flowmeters take on polyamide 12 flow measurement challenge

Polyamide 12 is a high-performance plastic used in a variety of industries, from oil and gas production, to automotive, medical technology, and 3D printing. The production process involves several stages, beginning with the hydrocarbon compound butadiene and ending with the monomer laurolactam. When many of the components are connected, they form a chain - the base polymer polyamide 12.

Clamp-on ultrasonic flowmeters are offering a long-term measurement solution to the challenge of polyamide 12 flow measurement at incredibly high temperatures of around 280 °C. A revolutionary technology in the field of flow measurement, clamp-on flowmeters work by emitting ultrasonic waves that travel through the fluid inside a pipe. The time it takes for these waves to travel upstream and downstream is measured, and the difference is used to calculate the flow rate. This non-invasive technology offers numerous benefits, especially when dealing with challenging mediums and process conditions such as those involved in the production of polyamide 12.

Replacement of Coriolis flowmeters

At the production plant of the world's leading supplier of polyamide 12, the product stream of the base polymer behind the polymerisation reactor is divided into two sub-streams. Initially, Coriolis flowmeters were installed in both for quantity measurement. However, due to the process conditions, this wetted measuring technology was found to have serious shortcomings. The melting temperature of the polymer is around 180 °C, so the product stream needs to be heated continuously. This proved to be a constructive challenge for integrating the Coriolis flowmeter into the insulation. The minimum flow velocity required for vibration measurement necessitated a tapering of the pipe cross-section from DN50 to DN25, thereby causing a considerable pressure loss. Depending on operating conditions, the polymer may occasionally solidify causing irreparable damage to the Coriolis flowmeter.

This is where FLEXIM's clamp-on ultrasonic flowmeters proved to be a highly flexible solution. They are quick to install and do not require any alterations to existing pipelines or necessitate process shutdowns. Due to the extreme process temperatures of around 280 °C, ultrasonic transducers were installed on a patented mounting fixture at both measuring points. This high temperature device is designed to separate the transducers thermally from the hot pipe and ensures optimal acoustic contact.

Practical advantages

The measurement was initially intended as a temporary bridging, but proved so convincing that it was decided to permanently measure the two polymer partial flows using clamp-on ultrasonic technology. An additional advantage is the high sensitivity of acoustic measurement technology to low flow velocities. Therefore, tapering of the pipe cross-section can be dispensed with, which consequently means less pressure loss and allows a reduction in pump power consumption.

For more detailed information on the benefits of non-invasive ultrasonic flow measurement in the chemical industry, contact Simon Millington - www.flexim.co.uk | sales@flexim.co.uk | +44 (0)1606 781 420