

## Enhancing pulp and paper process efficiency with ultrasonic flowmeters

Endress+Hauser's Proline Prosonic Flow P 500 ensures accurate measurements and minimizes downtime

### Proline Prosonic Flow P 500 Benefits

- Reduces inlet runs to a minimum, requiring only two diameters of straight pipe upstream and downstream the flowmeter
- Proven sensors, in combination with a maintenance-free mounting system, deliver long-term stable signals at any temperature range up to 1,022 °F
- An integrated web server offers full remote access, while the device's touch display offers convenient on-site interaction
- Heartbeat Technology, with its integrated diagnostics, verification and monitoring functions, improves reliability and process safety



**Summary:** A paperboard manufacturer, headquartered in the United States, specializes in crafting premium milk cartons, cups and folding cartons for discerning markets. The company's products help provide more sustainable alternatives to those created from non-renewable resources.

The company needed accurate and reliable flowmeter instrumentation to optimize its pulp and paper process. After facing challenges regarding inaccurate measurements and downtime during imperative processes, the company turned

to Endress+Hauser and its sales and service representative partner, Field Instruments & Controls, for ultrasonic flowmeter instrumentation. As a result, the company can now move forward with the confidence that its measurements are accurate and reliable, minimizing downtime.

**Challenge:** The company's commitment to quality and advanced technology processes relies heavily on accurate flow measurements. The company encountered persistent challenges regarding its flow measurements, specifically with flowmeter faults disrupting critical processes.

Operating without accurate flow measurements posed significant challenges for the company. Their previous approach required simulating numbers and models, which still led to difficulties. Additionally, shutting down the vessel was not feasible without a major shutdown, which involved a lengthy process of three to four days to empty the vessel, followed by shutdown procedures that could take a week to ten days to resolve.

In its industrial setup, a chip belt feeds into an impregnation vessel where white liquor is introduced. White liquor, also known as cooking liquor, is an aqueous solution of sodium hydroxide (NaOH) and sodium sulfide (Na<sub>2</sub>S). It is used in the pulping area of the mill. The impregnation vessel plays a crucial role in the pulping process, where the chips are treated with chemicals to break down lignin and separate fibers. Maintaining specific ratios of white liquor, temperature and circulation is essential for efficient impregnation.

A critical flow related to black liquor—referred to as the WID (also known as the impregnation vessel)—was missing. Black liquor, a byproduct of the pulping process, contains dissolved lignin and other organic materials. Its absence can disrupt the overall process balance and affect subsequent production steps.

The pulp/liquor mixture is pumped through a transfer line into a digestive vessel from the impregnation vessel. This



The Proline Prosonic P 500

vessel further breaks down the chips, allowing for better fiber separation. Unfortunately, multiple extraction points, which attract liquor from various stages, experienced flow challenges. Flow plays a vital role in maintaining precise control over the process. With accurate flow measurements, achieving optimal levels becomes easier.

The vessel's need to keep its process running compounded the urgency to find a reliable solution.

**Solution:** The company turned to Endress+Hauser and Field Instruments & Controls to help solve its process woes with the Proline Prosonic Flow P 500 ultrasonic clamp-on flowmeter. These flowmeters can be clamped externally to pipes, enabling installation without process interruption.

The Proline Prosonic Flow P 500 offers the following benefits:

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Matching models and achieving balanced flows throughout the process were key benefits for the company. The ultrasonic flowmeters accurately reflected calculated flowrates, ensuring precision. The introduction of the Proline Prosonic Flow P 500 marked a turning point and underscores the significance of reliable flowmeters in maintaining process integrity.

The accuracy of the ultrasonic flowmeters significantly improved the company's overall operations. These flowmeters performed reliably at every level, consistently providing accurate measurements. This was a critical need for the company, and the solution worked effectively, enabling them to run crucial measurements with confidence and reliability.

Using the flowmeter's clamp-on method helped ensure the company did not encounter lock-out, depressurization or even shutdown.

**Results:** Following the installation of the Proline Prosonic Flow P 500 ultrasonic flowmeter, the team successfully matched flowrates. Moreover, Endress+Hauser and Field

Instruments & Controls installed the flowmeter while the process was running, avoiding costly shutdowns.

Without the use of Endress+Hauser's Proline Prosonic Flow P 500, it would have been difficult for the company to have as much visibility into its process. It would have been challenging to detect valve defects where flowrates, for example, could drop by hundreds of gallons per minute. If those drop-offs are not plugged, that's a critical interruption in the process. Using the flowmeter's clamp-on method helped ensure the company did not encounter lock-out, depressurization or even shutdown.

Installing these flowmeters holistically led to balanced flows, significantly enhancing process efficiency, accuracy and stability. The company was one of the first to adopt ultrasonic flowmeter technology for liquor balance, showcasing the success of the new approach.

#### Menu/Expert/Sensor/Properties/Properties signal path 1/

Time of flight difference	65.12 ns
Time of flight	169.39 $\mu$ s
Nominal time of flight	167.90 $\mu$ s
Minimum time of flight	143.42 $\mu$ s
Maximum time of flight	237.24 $\mu$ s
Flow velocity	0.85 m/s
Sound velocity	1505.61 m/s
Signal strength	67.8902 dB
SNR upstream	57.1521 dB
SNR downstream	57.8718 dB
Signal to differential noise ratio	57.0713 dB
Acceptance rate	100.0 %
Cross correlation factor	0.99
Received frequency	910368.4 Hz



Using the flowmeter's clamp-on method helped ensure the company did not encounter lock-out, depressurization or even shutdown.

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