



APPLICATION REPORT Chemical

Modular solution for dosing of paper sizing additives

- Real time process control of additives in line with production rates of paper machine
- Consistent sizing emulsion thanks to accurate and repeatable flow measurement
- Coriolis mass and electromagnetic flowmeters for a skid-mounted specialty chemical feed unit



1. Background

US-based EGM is a leading producer of value-added process and chemical feed systems for a wide range of industries and applications. The company provides design, construction, startup, and repair services for skid-mounted process equipment. Among others, the company specialises in the design and construction of ASA (alkenyl succinic anhydrides) size emulsification equipment for the paper manufacturing industry.

2. Measurement requirements

For a specialty chemical supplier of an ASA sizing agent, EGM constructed a skid-mounted specialty chemical feed unit designed for preparing an ASA sizing emulsion. The ASA sizing agent is a crucial medium in paper manufacture. The product must be blended with a cationic emulsifier in a pre-determined ratio with the ASA and dilution water which is mixed under high energy conditions to form a cationic emulsion. The cationic charge allows the mixture to stay with the fiber during the process of forming the sheet of paper. Once the sheet passes through the dryer section of the paper machine, the chemical “cures” and provides water resistance to the paper.

The process is continuous and feeds directly to the paper machine. To impart water resistance to paper and board products, an accurate dose of ASA emulsion is required to keep the product within final specification.

ASA must be emulsified on site, so it is a real time blend of chemicals that must be combined at a specified ratio, but with a variable total flow demand. The dosing rate changes based on the nature of the fiber used to make the paper, the production rate of the paper machine, and the type of paper being produced. Accurate and repeatable flow measurement and control of the ASA, the emulsion and dilution water is critical to make sure the proper mixture is made. The emulsification system was therefore to be equipped with flowmeters having a track record in chemicals dosing.

Products	Flowrate
Various chemicals	400...1200 m/min
Primary dilution water	2...14 l/min
Secondary dilution water	20...120 l/min



3. KROHNE solution

KROHNE meters were tested and found to be the perfect fit for this application. They best met the customer's requirement in terms of accurate and repeatable flow measurement, yet come cost-competitive which convinced the systems provider.

The dosing skids are equipped with the OPTIMASS 6400 C Coriolis mass flowmeter and the OPTIFLUX 4300 C electromagnetic flowmeter:

- Since ASA is an oil-based chemical and therefore non-conductive, the OPTIMASS 6400 C is used to measure the ASA flow rate. The high-end Coriolis mass flowmeter provides superior performance in dosing applications. It is designed for high accuracy measurement (with a measuring error of only $\pm 0.05\%$ in liquid applications) as well as outstanding repeatability. Featuring Entrained Gas Management (EGM™), the flowmeter maintains operation over a wide range of gas fractions and complex flow conditions
- The emulsifier is water-based and is thus measured by the OPTIFLUX 4300 C. In addition, the electromagnetic flowmeter is used for flow measurement of primary and secondary dilution water as well as the mixing pump recirculation rate. The high-end flowmeter is particularly suitable for critical applications requiring high accuracy and enhanced diagnostic functions. With its wide range of liners and electrode materials it is suitable for a wide range of products, even many corrosive or abrasive chemicals.

For the skid-mounted units, the compact variants (C) of the flowmeters are used. The readings are transferred to the PLC of the end-customer.



Flow measurement of ASA sizing emulsion with OPTIMASS 6400 C



OPTIFLUX 4300 C measuring the flow of emulsifier

4. Customer benefits

By incorporating accurate flow instrumentation and a PLC controller, the end user is guaranteed to have a consistent sizing emulsion. Using the OPTIMASS 6400 and OPTIFLUX 4300 flowmeters, the composition of the sizing emulsion is always correct and precise control of all flows is possible. The PLC is programmed to provide real time ratio control of the additives and as the production rate of the paper machine changes.

Next to accurate dosing and repeatable performance the flowmeters allow for a compact package that is easy to fit into a relatively small space and easy for the end user to maintain.

5. Products used

OPTIFLUX 4300 C

- Electromagnetic flowmeter for advanced dosing applications with chemicals
- High accuracy ($\pm 0.2\%$ measuring error), certified for custody transfer

OPTIMASS 6400 C

- Coriolis mass flowmeter for advanced process applications with high accuracy requirements (measuring error: $\pm 0.05\%$ flat)
- Maintains operation over a wide range of gas fractions and complex flow conditions (EGM™)



Contact

Would you like further information about these or other applications?
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