APPLICATION REPORT Chemical

Flow measurement for cold-mix asphalt production

OKUR

- Effective process control to achieve a consistent bitumen emulsion quality for sprayer trucks
- Replacement of regularly clogged turbine meters for bitumen and emulsifying solution
- Reduced maintenance costs with a combined solution of Coriolis and electromagnetic flowmeters

1. Background

Turkish manufacturer Okur Makina San. A.Ş. specialises in the production of bitumen handling systems and equipment for road construction and maintenance. The product portfolio of the company also includes bitumen emulsion systems to produce cold-mix asphalt (CMA).

2. Measurement requirements

Bitumen emulsion systems allow for an economical production of CMA to be loaded on paving equipment such as asphalt sprayer trucks. To this end, bitumen – a hydrocarbon residue from crude oil distillation – is mixed with an emulsifying solution with aggregates.

CMA is safe and easy to use on spray-on applications and causes reduced amounts of carbon emissions as compared to hot-mix asphalt as there is no need to keep the aggregates heated, requiring a significantly lower amount of energy. However, processing bitumen is challenging since it solidifies at ambient temperatures before it is mixed with emulsifiers.

Application data		
Medium	Bitumen	Emulsifying solution
Flow rate	10 t/h	5 m^3/h
Density	980...1100 kg/m^3	1000 kg/m^3
Temperature	+180°C / +356°F	+50°C / +122°F

To achieve the desired bitumen emulsion, the bitumen and the emulsion solution must be processed in a certain ratio. This requires accurate dosing procedures. Okur Makina had previously used a turbine type flowmeter for both bitumen and emulsion solution measurements. This flowmeter type had frequent clogging issues with a significant impact on measurement accuracy. The repeatability of measurement was also very poor due to coatings inside the flowmeter. The company was therefore searching for alternative flowmeters more up to the requirements of the application.

KROHNE

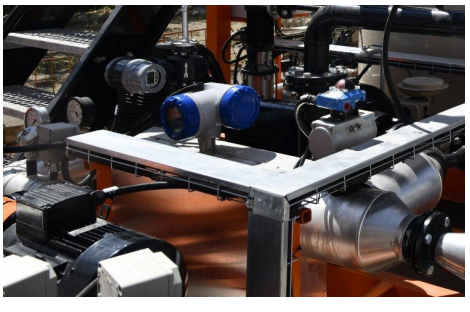
3. KROHNE solution

Given the customer's experience with the previous instrumentation, Okur Makina preferred flowmeters without moving or rotating parts in the measuring tube. For bitumen mixing, KROHNE recommended using the OPTIMASS 6400, a Coriolis mass flowmeter with a track record in bitumen and asphalt measurements.

Designed for use in high temperature applications of up to +400°C / +752°F, the OPTIMASS 6400 ideally fitted the bitumen that is transported at +180°C / +356°F to prevent solidification. The twin-bent tube flowmeter with stainless steel measuring tube provides the high dosing accuracy and repeatability that is needed for mixing the bitumen with the emulsifying solution. It was installed into the bitumen feed line using DN50 flange connections.

The emulsifying solution, basically a mixture of emulsifier, water, hydrochloric acid and aggregates, is a conductive fluid and thus an ideal application for robust and cost-effective electromagnetic flowmeters (EMF). The OPTIFLUX 4050 proved to be the EMF that provides the sufficiently repeatable flow measurement needed for the dosing procedure.

Bitumen emulsion plant with cold asphalt tanks and sprayer truck loading



Flow measurement of bitumen with OPTIMASS 6400 Coriolis mass flowmeter

Flow measurement of emulsifying solution with OPTIFLUX 4050

4. Customer benefits

The customer benefits from an effective and reliable process control for mixing of bitumen and emulsifying solution. There is no more measurement failure due to clogging of the measuring tube or coating of the flowmeter liner. Plant uptime and measurement performance have been increased and maintenance costs reduced. Efficiency and reliability of CMA production has therefore been significantly improved.

Getting everything from one source paid off for Okur Makina. Being a full scope supplier, KROHNE did not only provide the instrumentation, but also the necessary services, such as the pre-sales consultancy during the project phase and the technical support during the commissioning of the instruments.

5. Products used

OPTIMASS 6400

- Coriolis mass flowmeters for high temperature applications up to +400°C / +752°F
- High accuracy (±0.05% flat)
- Flange: DN10...300 / ½...12", max. PN 160 / ASME Cl 1500

OPTIFLUX 4050

- Electromagnetic flowmeter for basic applications with abrasive and aggressive liquids
- Chemically resistant liner materials
- Flange: DN2.5...1200 / 1/10...48", max. PN40 / ASME Cl 600

Contact

Would you like further information about these or other applications?
Do you require technical advice for your application?
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