

APPLICATION REPORT

Machinery & Apparatus

Flow monitoring in cement grout injection

- Equipping mobile grout monitoring systems with an ultra-compact filling mag meter
- High accuracy flow measurement of abrasive cement slurry
- Fast processing and data transfer for real-time process monitoring
- Improved injection grouting in line with changing requirements on site



1. Background

Öncü Otomasyon, based in Ankara, Turkey, is an automation machinery manufacturer. The company engineers and produces mobile grout monitoring systems for cement grouting applications as part of their portfolio.

2. Measurement requirements

Cement grouting involves the injection of a fluid to fill cracks or voids in underground rocks as well as fracture in concrete and masonry or in the soil. The cement-based grout is a dense slurry consisting of cement, water and bentonite mixed in a certain ratio. The main factor here is that injection pressure and injection speed are adjusted to the hollow body being filled. Öncü's grout monitoring system is designed in accordance with these requirements. The compact skid unit is equipped with process instrumentation and a recording unit with display to make grouting controllable, traceable and reportable.

One of the most important aspects in cement grouting is flow measurement. To further optimise the performance of their monitoring skids, Öncü was looking for the most suitable measuring instrumentation that allows for flow measurement at quickly changing process conditions and fluid compositions. This required the flowmeter to be highly accurate and fast. The volume flow rate (up to 0.5 l/s) serves as a control variable to operate grouting stations, grouting pumps, mixers and agitators. Each of these components work together. Any delay or technical failure creates unpredictable results with a negative impact on grouting efficiency. Given that the cement/water solution is highly abrasive, flowmeters with ordinary liners were not an option.

KROHNE

3. KROHNE solution

Having discussed and tested a wide range of process instrumentation, the BATCHFLUX 5500 turned out to be the flowmeter of choice for the grout injection skid. Designed for filling and dosing, this ultra-compact electromagnetic flowmeter (EMF) has a track record in special batching applications with liquids containing solids.

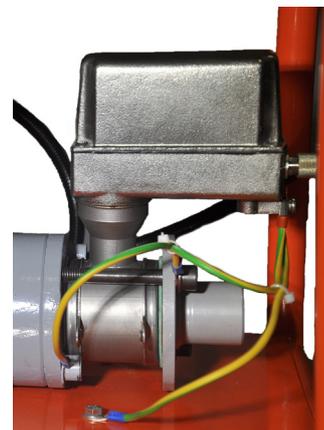
The BATCHFLUX 5500 features a rugged ceramic flow tube with gap-free fused-in-place electrodes featuring high abrasion and corrosion resistance. This makes the EMF particularly well suited for monitoring grout injection at higher pressures. It offers all the high accuracy, excellent long-term stability, repeatability and fast response needed for the demanding conditions of grout injections.

Requiring only minimum inlet/outlet runs, the flowmeter (DN25) fits perfectly into the small piping mounted on the grout monitoring systems. As average pressure conditions are around 18...20 bar / 261...290 psi, the skids are equipped with the standard version of the KROHNE mag meter. If required by the end-customer, however, Öncü can also fit their units with a dedicated high-pressure version up to 200 bar / 2900 psi.

The KROHNE flowmeter comes with integrated electronics and a 10 kHz frequency output, offering fast and precise data transfer. The volume flow rate of the cement injection is transmitted to the recording unit and displayed for online monitoring.



Cement grout monitoring skid with KROHNE flowmeter



BATCHFLUX 5500 on mobile grout monitoring system



Recording unit of the grout monitoring system

4. Customer benefits

The BATCHFLUX 5500 provides permanent knowledge about one of the key grouting parameters. The volume flow rate of the cement/water mixture filled into cracks and holes can be precisely recorded and analysed for further optimisation and logging for quality assurance. The fast processing and data transfer of the KROHNE mag meter allows real-time monitoring of the grouting process. Due to accurate and repeatable flow measurement, Öncü's clients benefit from improved and much more stable grout injection procedures in line with their changing application requirements on site.

5. Product used

BATCHFLUX 5500

- Electromagnetic flowmeter for demanding volumetric filling and dosing applications
- High speed and high accuracy measurement in process batching
- With ceramic measuring tube and sintered electrodes for applications up to 40 bar / 580 psi, optional range up to 200 bar / 2900
- 10 kHz frequency output integrated



Contact

Would you like further information about these or other applications?
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