



APPLICATION REPORT Construction

Performance testing of vacuum excavators

- Detecting and monitoring the performance decline of excavation equipment
- Use of a flexible, battery-powered ultrasonic clamp-on flowmeter to assess the suction capacity of different vacuum trucks
- Non-invasive flow measurement of wastewater with suspended solids at high velocities



1. Background

A. de Reus is a Dutch construction company specializing in civil engineering. The company's core activities include soil remediation, soil suction, site preparation, and concrete work, primarily for clients in the petrochemical industry. For heavy-duty groundwork, they operate a fleet of trucks equipped with vacuum systems. These vacuum excavators offer a safe and efficient method for suctioning materials from heavy and wet soil in hard-to-reach areas. The total fleet comprises a wide variety of vacuum excavators, ranging from 12-year-old models to brand new equipment.

2. Measurement requirements

To assess the efficiency of various excavator models and track performance declines across equipment generations, the company was searching for a suitable performance testing device. The instrument needed to be flexible for quick installation on different suction pipes, enabling the measurement of surface water volume flow rates drawn from a container. The water, containing suspended solids, flows through high-density polyethylene (HDPE) pipes (DN200 / ~8") at high flow rates of up to 700 m³/h.

3. KROHNE solution

The company decided in favour of the OPTISONIC 6300 P ultrasonic clamp-on flowmeter. The device features a rugged, easy-to-mount clamp-on sensor rail connected to a portable, battery-powered signal converter. It allows the operator to quickly mount or remove the flowmeter from the suction pipes of the vacuum trucks.

KROHNE

The flowmeter's flexibility makes it ideal for check and comparative measurements on mobile equipment such as vacuum excavators. The latest version of the meter has further improved measurement performance for applications with dirty water containing suspended solids. As a result, the OPTISONIC 6300 P can measure with long-term stability even under difficult conditions. With its IP66/67 rating, the flowmeter is suitable for use in the outdoor environment of the customer and even withstands heavy rainfall.

The clamp-on flowmeter is equipped with a mobile tablet that connects to the portable signal converter via Bluetooth®. This allows readings to be conveniently monitored from several meters away from the installation. The integrated data logger of the portable converter enables the customer to collect readings from different vacuum excavators for comparison purposes. The stored data can be easily shared using the tablet's sharing function, allowing data transfer via email, cloud solutions, or popular messaging apps such as "WhatsApp."

The complete clamp-on flowmeter is delivered in a wheeled trunk or soft case, ensuring safe transport and easy portability of the OPTISONIC 6300 P.



Performance testing of a vacuum excavator using the OPTISONIC 6300 P clamp-on flowmeter

4. Customer benefits

The OPTISONIC 6300 P offers the customer a flexible way to test the performance of their vacuum excavator fleet. Using the flowmeter's built-in data logger, the operator can collect multiple flow data such as actual and total volume flow rate, flow velocity or sound velocity to evaluate the suction efficiency of various models across different flow ranges and stages of their lifecycle.

The KROHNE clamp-on flowmeter ensures reliable, long-term stable measurements of surface water with suspended solids. With its non-intrusive technology, the flowmeter avoids direct contact with the medium, eliminating issues with wear and tear. It also remains unaffected by oil and fat build-ups. While clamp-on devices may not match the absolute accuracy of inline flowmeters, advanced clamp-on meters like the OPTISONIC 6300 P provide excellent repeatability and good accuracy over a wide dynamic range, which makes them a versatile and cost-effective service tool.

KROHNE also offers the clamp-on device as a rental option in many countries, allowing customers to perform temporary flow measurements at a reduced cost. Ultrasonic clamp-on flowmeters are part of KROHNE's extensive flow measurement portfolio, which includes six different flow technologies.

5. Product used

OPTISONIC 6300 P

- Ultrasonic clamp-on flowmeter for temporary flow measurement of liquids
- Portable, battery-powered meter used to collect additional flow data or cost-effective on-site verification of inline flowmeters
- For pipes DN15...4000 / ½...160"; up to +120°C / +248°F
- Portable signal converter with integrated data logger
- Commissioning, monitoring and data analysis via a mobile smart device using the OPTISONIC 6300 P mobile app



Contact

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

Please visit our website for a current list of all KROHNE contacts and addresses.

