



## APPLICATION REPORT Iron, Steel & Metal

### Clamp-on flow measurement of coolants for an induction furnace

- Safe operation of an electric furnace for a hot-dip galvanising line
- Limit value monitoring of demineralised water for cooling purposes
- Reliable monitoring of the cooling process using non-invasive ultrasonic clamp-on flowmeters
- Fast measurement response time increases energy efficiency and improves production cycles

#### 1. Background

AcelorMittal NV is the largest steel manufacturer in Belgium. The company's main steel products include finished flat products such as hot-dip galvanized sheet. Hot-dip galvanizing (HDG) is one of the most effective methods to render cold-rolled sheet corrosion-resistant by dipping it into a vat of molten zinc. These coated sheet products are produced according to the strictest quality standards.

HDG requires the metal sheets to be properly pre-treated prior to galvanizing. This includes degreasing and thermal treatment. Only if the sheets are heated up to a certain temperature can an optimum coating be achieved. The hot-dip galvanizing line is therefore equipped with an induction furnace to preheat the sheets to up to +800°C / +1472°F before cooling them down to around +460°C / +860°F. The sheets are then passed through the zinc bath.

#### 2. Measurement requirements

The induction furnace is connected to a cooling system to protect it from overheating. To this end the furnace coil is cooled by a cooling circuit with demineralised water. The water flow rate was previously monitored by differential pressure. However, the DP flowmeters were extremely sensitive to contamination, resulting in slow response times. In some cases, the pumps had to be started several hours before the actual production process started. This was extremely time consuming and anything but energy efficient.

Due to the given installation length of the previous meter, the use of a vortex flowmeter seemed to be an ideal replacement and was initially considered as an alternative instrumentation. However, as the inlet runs were too short and the operator wanted to avoid changing the infrastructure and cutting the pipework, another cost-effective solution for cooling monitoring was required. Due to the proximity to the induction furnace, the application is located in a plant area with a lot of electromagnetic radiation.

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## 3. KROHNE solution

The plant operator installed 12 OPTISONIC 6300 clamp-on flowmeters on the induction furnace cooling lines. The non-intrusive ultrasonic flowmeter fully met the requirements of this application as it is particularly suitable for flow measurement of (non-)conductive liquids at any location where inline measurement is not possible or desirable.

It consists of a stainless-steel sensor rail with two integrated transducers. KROHNE's mounting rail with click-and-turn mechanism enabled a fast and reliable installation. The clamp-on flowmeter was quickly mounted, commissioned and made operational without any need for time-consuming changes to the infrastructure. It is used with a wall-mounted signal converter for permanent flow measurement in this application.

The flowmeter continuously monitors the cooling circuit to ensure a minimum flow rate of cooling water. The operator has therefore parameterised a threshold value in the meters for each line. When the flow exceeds this limit value, the meters send a signal to the PLC. In this way, the operator always knows when enough cooling is provided and the production process can start.



OPTISONIC 6300 with wall-mounted signal converter

Ultrasonic clamp-on rail mounted on cooling line

## 4. Customer benefits

The clamp-on ultrasonic flowmeter provides the responsive measurement essential for efficient cooling of the induction furnace. Unlike the previously used flowmeter, this device ensures real-time monitoring of flow rates in accordance with defined threshold values. This significantly enhances process reliability and has accelerated production cycles. The flowmeter has also improved energy efficiency as it eliminates the need to start the pumps hours in advance to obtain readings, leading to a more sustainable process and reduced carbon emissions in the end. Installation of the clamp-on ultrasonic flowmeter was straightforward and cost-effective. With KROHNE's unique clamp-on rails, the device was quickly mounted and commissioned without interrupting the process. The non-intrusive meter design ensures a safe and leak-free installation with reduced installation effort. To use the clamp-on flowmeter, it is not necessary to interrupt the process, cut the pipework or modify the infrastructure.

The KROHNE ultrasonic flowmeter offers excellent repeatability, which in this application was much more important to the customer than absolute accuracy. The OPTISONIC 6300 is just one of a wide range of ultrasonic flowmeters that KROHNE has on offer. This also includes high accuracy inline flowmeters for all sorts of use from utility and process applications to custody transfer.

## 5. Product used

### OPTISONIC 6300

- Ultrasonic clamp-on flowmeter for flow measurement of liquids
- Stationary device, for installation at any location without process interruption or need to cut pipes
- Robust stainless steel sensor rail for pipes DN15...4000 / ½...160"
- With remote field-mounted (F) or wall-mounted (W) signal converter



### Contact

Would you like further information about these or other applications?  
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