



## APPLICATION NOTE

Iron, Steel & Metal

### Flow measurement of zinc electrolyte in a zinc plating plant

- Automated process control for zinc electroplating of steel sheets
- High plant availability due to use of an electromagnetic flowmeter with chemically resistant ceramic measuring tube
- Long-term stable and safe measuring operation in a corrosive environment with strong magnetic field

#### 1. Background

One of the world's largest steel producers operates several production sites in France. Among other things, the company produces galvanised steel sheets for the automotive industry in Lorraine, Northern France.

#### 2. Measurement requirements

For zinc plating the electro-galvanising process is used. In this electroplating process, zinc is deposited on the steel sheets in a zinc bath by the aid of an electric current. The steel sheets are immersed in a bath with zinc electrolyte, an aqueous and acidic medium, at a temperature of +63°C / +145.4°F. In this way, the plates serve as cathodes on which the detached particles of a high-purity zinc electrode (anode) form an electrodeposited zinc-based protective film.

In order to obtain the desired surface finish, the galvanic bath control must be precise. Knowing the volume flow of the circulated electrolyte helps to optimise the galvanising process. In addition to the temperature, the flow rate is an essential process parameter for the quality of the electro-galvanising process. However, the medium is difficult to measure. The acid tends to crystallise as soon as it is no longer moved. The application is in a corrosive environment and in the presence of a strong magnetic field, which can lead to malfunctions and damage in many flowmeters.

In the past, the customer had measured the electrolyte flow manually with an ultrasonic flowmeter. However, for quality and safety reasons, the company decided to switch to continuous measurement with an inline flowmeter. The volume flow of the electrolyte (in m<sup>3</sup>/h) was to be determined at numerous measuring points. In order to automate the electrolysis process as far as possible, the measured values were to be transmitted directly to the control room.

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## 3. KROHNE solution

The customer equipped 38 measuring points with the OPTIFLUX 5300. The electromagnetic flowmeter (EMF) from KROHNE has a measuring tube made of high-tech ceramics for very aggressive liquids. It is extremely resistant to corrosion and vacuum. This makes the high-performance instrument ideally suited for flow measurement of zinc electrolyte or other chemical process applications in the metal and steel industry. With a measurement uncertainty of only  $\pm 0.15\%$  of the measured value, the OPTIFLUX 5300 is also one of the most accurate EMFs on the market.

The measuring instruments were mounted below the electroplating baths into horizontal PP-H (polypropylene homopolymer) pipelines. The flowmeters were provided as more cost-efficient and space-saving flangeless wafer versions.

## 4. Customer benefits

The customer benefits from continuous inline flow measurement. This enables the company to adjust the volume flow rate for bath control in all zinc plating tanks simultaneously, quickly and without delay. With the help of the OPTIFLUX 5300, the quality in zinc electroplating could be improved and the production process further automated. The measurement that had previously been always carried out manually and only selectively, is no longer necessary. This also increases the safety of the plant and personnel. The time spent in the harsh environment of the measuring points is significantly reduced.

Thanks to the unique combination of material properties such as surface hardness and quality, mechanical strength or resistance to corrosion and thermal shock, the OPTIFLUX 5300 is far superior to all EMFs with conventional liners. Due to its absolute acid resistance, it offers a high degree of safety and long-term stability where other EMFs equipped with plastic liners are damaged after a comparatively short time and must be replaced.



Flow measurement of electrolyte with the OPTIFLUX 5300 electromagnetic flowmeter

## 5. Product used

### OPTIFLUX 5300

- Electromagnetic flowmeter for zinc electrolyte and other chemical applications in the steel and metal industry
- With ceramic measuring tube for aggressive and abrasive liquids
- Fully vacuum-resistant and resistant to temperature shocks
- Highest accuracy:  $\pm 0.15\%$
- Flange or sandwich (wafer) version
- Available as compact or remote field version



### Contact

Would you like further information about these or other applications?  
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