

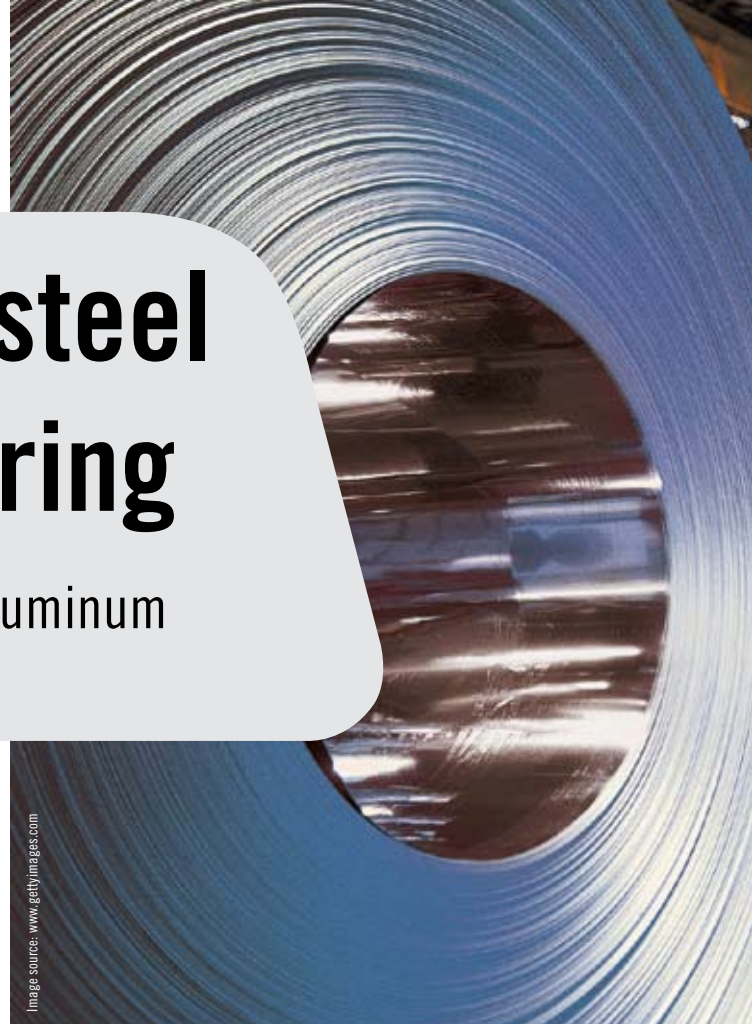
AlZin has the steel industry cheering

Innovative sensor measures aluminum content in molten zinc

Belgium-based sensor specialist Heraeus Electro-Nite has developed the AlZin sensor to fill a gap in the market and help companies cut costs and ensure quality by preventing corrosion in steel. The globally active company with headquarters in Houthalen focuses on customized system solutions for its clients.

The sensor for measuring the aluminum content in molten zinc is a novelty for the steel industry. Zinc is used to prevent corrosion in steel (particularly strip steel) for the automotive industry, for example. However, producers cannot apply a layer of pure zinc because it is too brittle, so they add a small amount of aluminum for stability. The effective aluminum concentration needs to remain as constant as possible to guarantee high quality. The small amount of aluminum, which ranges between 0.09 and 0.36% depending on the galvanizing process, ensures that the zinc coating maintains its shine, resistance to corrosion and stability.

In the past, aluminum levels in liquid zinc could only be measured with time-consuming sampling and analysis processes. “The new AlZin sensor can directly and continuously measure the concentration in zinc baths. Producers can immediately adjust the amount of aluminum in the event of a deviation, thereby reducing waste,” explains Paul Verstreken, developer of the innovative sensor. The ability to immediately determine aluminum content provides both a time and cost advantage, which can lead to substantial cost savings by reduced slag formation and ensuring a consistent metallurgical coating process.



The AlZin sensor is a novelty in the steel industry.



AlZin sensor: An electrochemical measuring cell determines aluminum content.

Measuring cell encased in a corrosion-proof shell

An AlZin sensor looks decidedly ordinary from the outside. A sensor head encased in an inconspicuous gray graphite chamber and attached to a long rod is supposed to provide quick and precise measurements of a specific metal in a zinc bath? It's what happens inside the gray casing that



Developers had some fundamental problems to solve for direct immersion measurement of molten zinc baths at 460°C. The electrochemical sensor must be resistant to thermal and impact shock, protected against moisture permeation during long storage, and inert in the harsh zinc-pot environment. For that reason, developers protected the sensitive measuring cell like it was wrapped in cotton – or in a tough housing of corrosion-resistant steel, to put it better. “NaCl/AlCl₃ is used as a liquid electrolyte, which must first be encased in a stabilizing, permeable capsule. Porous magnesia tubes proved to be a suitable material,” states Paul Verstreken, revealing another secret about the measuring cell.

AlZin “One Shot” expands measurement options

“When developing and optimizing our sensor portfolio, it helps that we have an excellent grasp of the melting process in the steel and iron industries. This allows us to offer individually customized solutions for our clients,” as Francis Dams, Head of R&D at Heraeus Electro-Nite, explains the formula for success in developing innovative sensors. “Our development departments design user-specific sensors for direct contact with molten metal and combine them with standard measurement methods.”

The sensor specialist has made quite a name for itself in particular by developing disposable sensors for the steel industry for measuring the temperature and chemical composition of molten steel and iron. While the trend is moving toward multifunctional sensors that measure several parameters in liquid steel, and uninterrupted measurement with durable sensors, the AlZin sensor line currently lacks a disposable version.

AlZin sensors are normally designed for constant use over 10 to 20 days. But an AlZin disposable sensor for quick, single-use measurement is right at the front of the development pipeline. This newly developed product – appropriately named the AlZin “One Shot” – is suited for smaller production cycles or intermittent processes where constant measurement with AlZin doesn’t make sense from an economic perspective. Another possible use scenario is in laboratory-scale galvanization testing. *Dr. Jörg Wetterau*



The AlZin sensor (on the right) expands the portfolio of sensors from Heraeus Electro-Nite.

counts: it contains an electrochemical measuring cell that rapidly determines the exact aluminum concentration. When used in combination with the AlZin-Lab E measurement instrument, it displays both the exact temperature of the zinc bath and the effective aluminum concentration (in %) on a monitor almost instantaneously.

Want to know more?

Francis Dams
 Head of R&D
 Heraeus Electro-Nite International N.V.
 Centrum Zuid 1105, B-3530 Houthalen, Belgium
 Phone: + 32 (0) 11.600-363
 E-mail: info@electro-nite.be, francis.dams@heraeus.com
 Internet: www.heraeus.com; www.electro-nite.be

