



# Spot on measurements

## How non-contact temperature measurement is effective in optimising production in the galvanising process

The purpose of the continuous galvanising line (CGL) is to apply a coating of zinc onto the surface of steel strip in order to increase its corrosion resistance. This is done by passing the strip through a molten zinc pot under tightly controlled temperature conditions. The strip is heated before contacting the zinc, then cooled before further processing.

Galvannealed steel also adds a second process. The strip is heated after zinc coating, causing iron to diffuse into the zinc, forming a harder more scratch and corrosion-resistant iron zinc alloy coating, that is more suitable for forming and spot-welding operations.

Accurate strip temperature must be maintained to produce high-quality products and in this controlled and varied environment, production engineers and technicians have two choices. The first is thermocouples, which measure the furnace atmosphere via contact temperature measurement and heat conduction, and secondly non-contact

sensors, which measure the temperature of the strip directly through radiated heat energy, in the form of infrared radiation (IR).

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Non-contact sensing methods normally need much further refinement to ensure that measurements are spot-on. Shiny bare metal surfaces have a low emissivity which can change during heating and cooling stages in the furnace or by controlled oxidation. Liquid zinc coated surfaces are mirror-like with high levels of reflection, resulting in a very low emitted radiation energy, which changes as the coating cools to a slightly less reflective surface.

### Non-contact solution

The SPOT GS instrument is designed specifically for galvanised and galvanized steel process lines, and can be used in both vertical and horizontal furnace arrangements. Not only can this device measure temperature via emitted radiation from steel strip as it travels between rolls, but with the GS+ algorithm, it can measure the temperature of liquid zinc at the exit to the process's zinc pot, giving engineers yet another option for controlling the process.

When used to measure strip temperature inside a furnace, accounting for background temperature traditionally meant using a water-cooled sighting tube, to prevent most of the hot reflections, or using a thermocouple to give background temperature readings. AMETEK Land's SPOT pyrometers are capable of taking these readings independently in most cases, without a water-cooling device or external thermocouple and adjusting to emissivity changes in the processed steel as needed within a few milli-seconds. When there is an extreme difference in background temperature, however, the SPOT is capable of using an external thermocouple or another reference pyrometer reading (measuring the background temperature) to compensate for the temperature as needed. This functionality is available with the correct parameters set up and therefore, for the most part, works without external input.

### Ready to process

Continuous on-line temperature measurement allows process line control systems to quickly and efficiently accommodate changes in strip dimensions or coating weight or type during the changeover between different customer orders. With the tight control afforded by the SPOT GS, it is possible to optimise furnace temperature controls for potential savings in heating costs, while still providing quality steel products demanded by customers in the advanced manufacturing sectors.

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