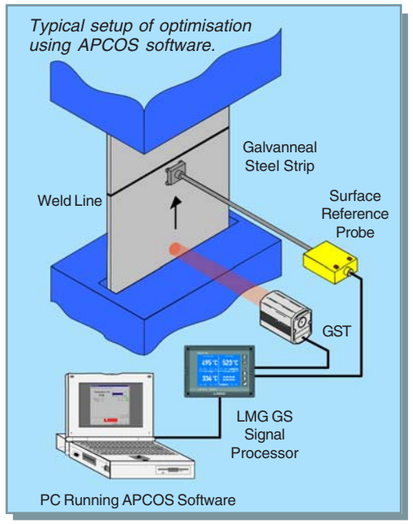
OPTIMISATION

As a result of experience gained from many site trials and installations, it has been found that slight variations are required in the temperature calculation coefficient values, in order to maximise the system accuracy at each measurement point.

A unique feature of the GST thermometer is the ability to optimise each unit individually. This may then improve the measurement accuracy at each location.

Optimisation requires a small number of temperature comparisons to be made on a representative sample of product types, against the GST Surface Reference Probe, which features a unique emissivity enhancing optic.

Optimisation is performed using APCOS (Application Processor Configuration and Optimisation Software), supplied as standard with the LMG GS processor. APCOS processes data and submits an optimised solution for the temperature calculation.



SYSTEM SPECIFICATIONS

Thermometer type:	GST
Measurement range (specified):	300 to 600°C/600 to 1100°F
Response time:	1s to 98%
Target size:	97mm/3.9 in at 2m/80.0in
Resolution:	2°C/4°F
Absolute accuracy:	Better than 10°C/18°F after optimization (in application)
System output	
Temperature indication:	0 to 20mA or 4 to 20mA (nominal load resistance 500 ohms, max load including wiring 600ohms)
Surface emissivity indication:	0 to 20mA covering emissivity range 0.00 to 1.00 Nominal load resistance 500 ohms, max load including wiring 600ohms) Alarm relays: contact rating 50V a.c./ d.c. at 0.5A max
Output update time:	30ms (thermometer channel output) 500ms (maths card output - optional)
Sealing:	IP65
Vibration:	3G any axis, 10 to 300Hz
Processor Type:	LMG GS (1 to 4 thermometer I/O channels)
I/O card type:	GST I/O card
Power requirements:	110 to 120V a.c. or 220 to 240V a.c., 48 to 62Hz, 35VA (max. with 4 thermometers)
Signal processing functions	
Time average:	63% time constant adjustable 0 to 500s
Ambient temperature limits:	
Thermometer	5 to 45°C/40 to 113°F
Processor	5 to 50°C/40 to 122°F
Weight	
Thermometer:	0.8 kg/1.76lb approx
Processor:	3.6 kg/7.93lb approx
EMC:	EN 50-082-2 (immunity), EN 50-081-1 (emission), IEC1010-1 (safety)

For recommendations on thermometer sighting and mounting, refer to Land Instruments International.

The Quality Management System at Land Instruments International Ltd is approved to ISO 9001:2000 for the design, manufacture, stockholding, in-house repair and site servicing of non contact temperature measuring instrumentation. Associated software is designed and developed in acordance with TickIT. The Quality Management System at AMETEK Land, Inc. is also approved to ISO9001:2000 and covers the engineering support and in-house repair facilities. LAND also operates extensive calibration services – with calibration traceable to National Standards. Calibration certificates are issued in compliance with ISO 17025:1999.

CE These products comply with current European directives relating to electromagnetic compatibility and safety (EMC directive 89/336/EEC; Low voltage directive 73/23/EEC).

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LABORATORY ACCREDITATION BUREAU ISO 17025

LAND
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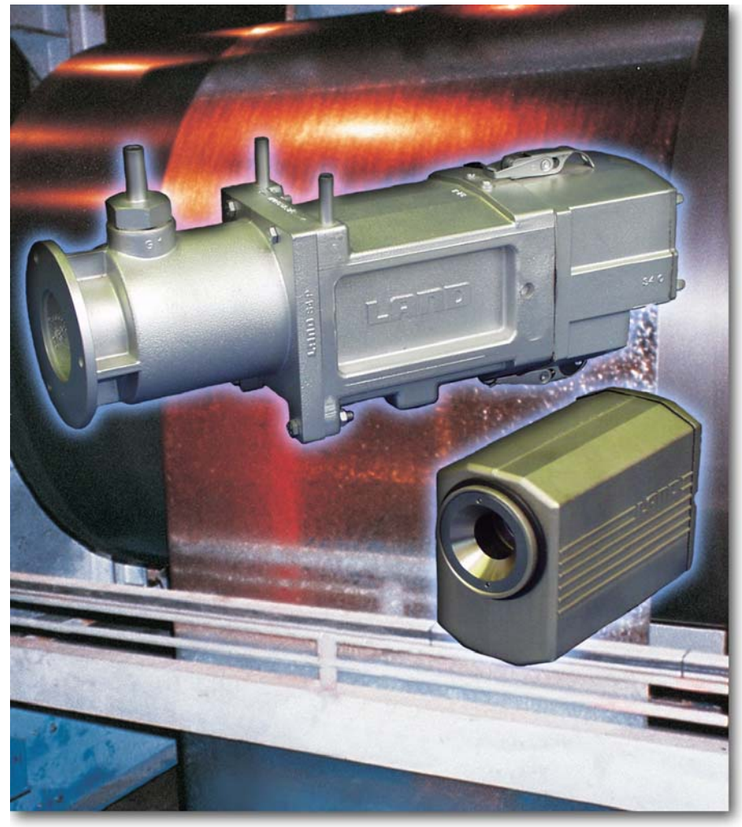


GST

GALVANNEAL STRIP THERMOMETER

An AMETEK® Company

LAND ACCURATE, RELIABLE TEMPERATURE MEASUREMENT AND CONTROL OF GALVANNEALING STEEL WITH THE NEW GALVANNEAL STRIP THERMOMETER SYSTEM ... GST

The Land GST has been specifically developed to provide continuous and accurate measurement of both temperature and emissivity on coated steel strip during the galvanneal reaction.

BENEFITS

Land GST allows close control of the reaction and position of the reaction zone, thus giving much tighter control of product quality.

By maintaining control of the reaction zone, GST accomodates rapid changes of line speed and furnace power with changes of substrate or coating weight.

The furnace is optimised to reduce heating costs, maximise throughput and avoid excessive over-reaction which would result in powdering or flaking of the coating during subseqent forming operations.

Land GST systems ensure the production of consistent, high quality, premium-coated steel, demanded by the automotive industry.

Without the close control provided by GST systems, manufacturers produce lower grade coated steels which cannot be sold to customers requiring premium-grade products.

FEATURES

- Accurate non contact temperature measurement on steel during the galvannealing process.
- Automatic emissivity compensation for variations in the reaction zone.
- Continuous emissivity readout for indication of extent of reaction.
- Reliable, drift free operation with a minimum of maintenance.

THE PROBLEM

Following the brief immersion of the steel strip in the zinc bath, the iron-zinc diffusion reaction is initiated at the metallic interface.

Subsequent reheating maintains and accelerates this reaction so that after a few seconds iron particles start to appear at the surface.

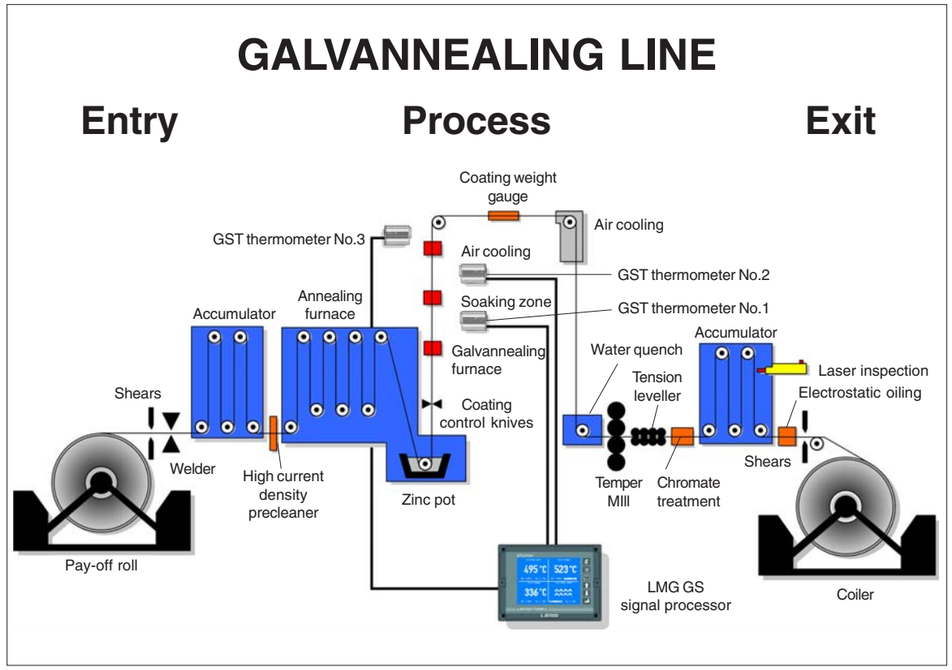
Just prior to this the emissivity is very low, being that of the molten zinc, but the emergence of the iron creates areas with a solid, crystalline and microscopically rough surface.

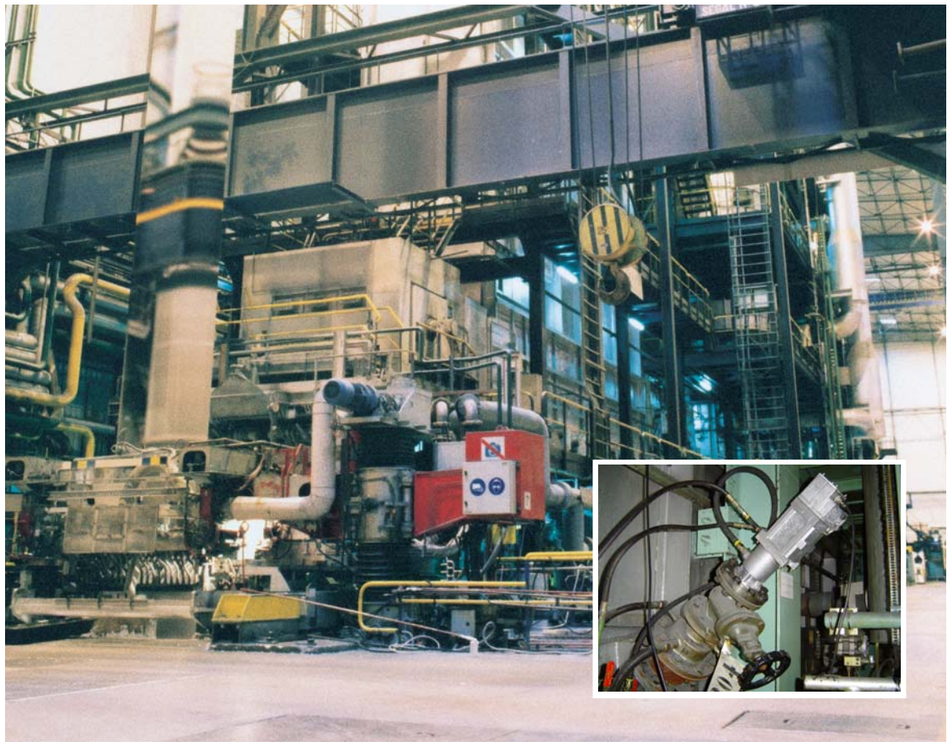
Over a short period of time (approx. five seconds) the emissivity value increases about fourfold and the non greyness factor (ratio of emissivities at two close wavelengths) also changes markedly.

This renders conventional single wavelength or ratio thermometer systems very inaccurate.

The position of the reaction zone within the galvannealing furnace will depend critically on temperature, line speed, coating weight, alloy type, strip width and gauge.

This makes control of the zone position difficult to achieve without very accurate knowledge of the temperature and the extent of the reaction (i.e. surface emissivity).





THE SOLUTION

The GST utilises an extremely accurate infrared radiation thermometer coupled to an intelligent signal processor containing a unique emissivity compensation algorithm.

Once set, the system can recognise and compensate automatically for the emissivity changes as they occur.

Measured target emissivity, as well as temperature, is output by the processor to provide an indication of the extent of the galvanneal reaction.

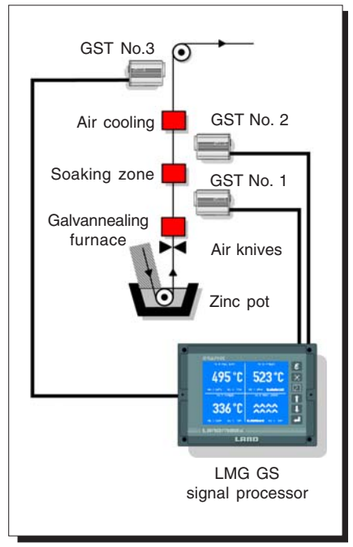
Up to four GST or System 4 thermometers can be connected simultaneously to an LMG GS processor.

Mathematical comparisons between the thermometer readings can also be made using the LMG GS's optional Maths Function Card.

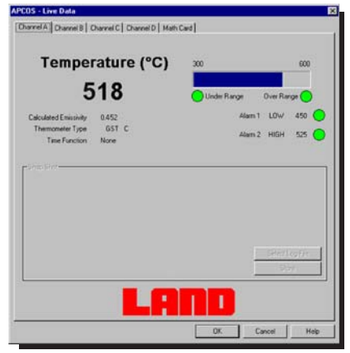
The LMG GS processor provides digital indication of temperature and current outputs for connection to the galvanneal furnace control system.

A new feature of the system is APCOS (Application Processor Configuration and Optimisation Software) which provides the ability to optimise each GST thermometer individually.

This further improves the measurement accuracy at each location.



A schematic showing installation positions.



A typical APCOS screen