

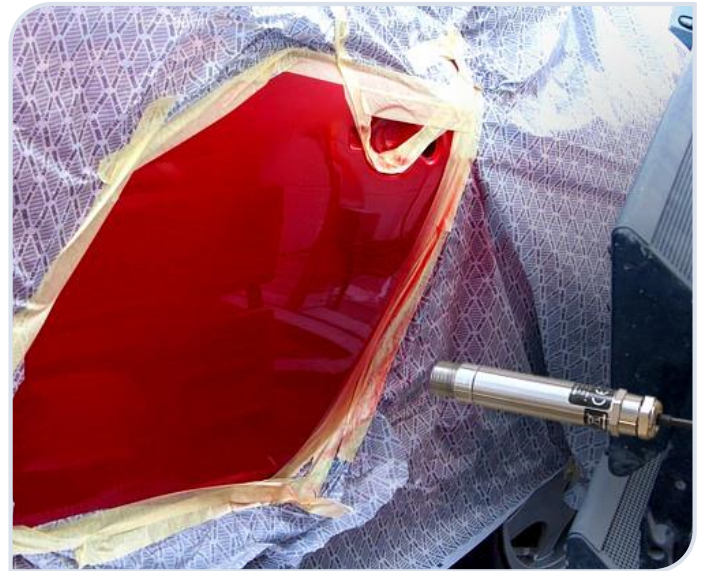
Infrared Temperature Measurement in Paint Curing

with PyroCouple and PyroMini infrared temperature sensors

In the painting of products such as automobile body panels, long term durability and consumer appeal depend upon the quality of the coating application processes. This quality, determined by adhesion, hardness, corrosion resistance, finish and colour, depends largely upon curing temperature cycles. Calnex's non-contact infrared temperature sensors are capable of giving the user or OEM tight control over this cycle, where none existed before.

The automotive painting process generally consists of the application and curing of one or two primer coatings, and another one or two of paint. Both infrared radiant and convection heated ovens are employed to "ramp" the temperature up at a controlled rate, and "soak" (hold the temperature) for a time predetermined to be optimum for proper curing of each part of the coating. Portable IR heaters are also used to cure re-painted areas (pictured right).

Prior to the installation of the IR temperature sensors, indirect measurement methods were used. One consisted of monitoring air temperature in the oven to infer the surface temperature, which was inaccurate, especially in radiant heat sections. Another was a time-consuming, offline spot check, consisting of running a special thermocouple-equipped scrap car body through the ovens on a periodic basis.



The Calnex sensors allowed direct, accurate, on-line measurement of the surface temperature. The infrared sensor also allowed separate controls to be introduced for top and side heating. This was valuable, due to the differing thermal masses and therefore heating rates of the automobile roof and sides.

Two important facts emerged during the jobs:

1. Emissivities of different colours of paint did not vary more than 1%. A setting of 0.95 was used.
2. Peak hold and valley hold functions could be used to eliminate the effects of looking at heaters or oven walls in between car bodies.

Certain automobile manufacturers were quick to realise that the value the IR sensors provide, in the form of reduced painting rework, improved adhesion, more consistent colour and greater overall process control and quality, would allow for rapid return-on-investment. An improvement in their competitiveness in the automobile market has resulted.



SUITABLE MODELS

Due to the high emissivity of painted surfaces, the low-cost PyroCouple series of sensors gives good results. They can be positioned in gaps between infrared heaters, and provide an analogue 4-20 mA, millivolt or thermocouple output for measured temperature. They may be used without cooling in areas where the ambient temperature is below 70°C.

The sensing head of PyroMini -HA models may be positioned where the ambient temperature can be up to 180°C, for example inside convection ovens. No cooling is required. The PyroMini is available with analogue or digital outputs, and the optional touch screen interface provides temperature display, alarm relay outputs and data logging to MicroSD Card.

The accurate non-contact temperature measurement ability of these sensors is equally applicable to all other coating and painting applications.

For more information or assistance, please contact Calnex.



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