

# Chocolate & Toffee Manufacture

## using IR Thermometry

---

An internationally famous manufacturer uses fixed infrared thermometers to control:

1. Chocolate bar mould temperatures prior to automatic deposition of molten chocolates (PyroUSB-301).
2. Before mould heating of chocolate in temperature controlled "kettles".
3. Toffee web temperatures coming off of cooling drums (PyroCouple-151).

For the chocolate bars, mould temperature control is extremely critical in order to control the resulting solid surface and microstructure of the mixture. These factors determine the texture, colour, taste, consistency and even shelf-life of the bars. Components of the mixture would separate (fats going to the surface) if mould temperatures were too high, or crystallise if the mould temperatures were too

low. Installation of Calex PyroUSB Sensors allowed virtual elimination of this problem thereby boosting profitability of each line.

Equally beneficial to the customer was the installation of Calex PyroCouple sensors to control toffee web temperatures during cooling. Again, those characteristics of the product which determine its quality to the consumer were guaranteed by direct temperature measurement and control. Product sticking to wrappers, caused by inadequate cooling was eliminated. Also breakage of cutting blades by excessively hard (overcooled) product was stopped.

The value of infrared thermometers illustrated by this application extends equally to large segments of the food processing and processing

equipment industries. The level of automation activity in these markets has increased in recent years for cost reduction/quality improvement purposes, following trends set by other process industries. Infrared offers the following values to food customers:

1. Non-contact/Non-intrusive. For measuring food products which may be moving, without contaminating or disturbing product.
2. Direct product measurement. Gives accurate, 100%, real-time temperatures. Eliminates the need to make inferences from air (or other related) temperatures, which are less accurate and fluctuating.
3. Thermocouples/RTDs often become coated and therefore insulated from contact with products in liquid form, causing inaccuracy. Infrared sensors do not.

# Automotive Paint Curing

## using IR Thermometry

---

In the painting of new automobile bodies and many other products, long term durability and consumer appeal are dependent 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. Calex's non-contact infrared temperature sensors are capable of giving the user or OEM tight control over this cycle, where none existed before.

The automobile painting process generally consists of the application and curing of one or two primer coatings and another one or two of paint. Both 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 all portions of the coating.

Prior to installation of the IR temperature sensors, indirect measurement methods were used. One consisted of monitoring air temperature in the oven to infer auto temperature, which was inaccurate, especially in radiant heat sections. Another was a time-consuming, off-line spot check, consisting of running a special

thermocouple-equipped scrap car body through the ovens on a periodic basis. Calex's sensors allowed direct, accurate, on-line measurement.

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 which surfaced during the jobs:

1. Emissivities of different colours of paint did not vary more than 1%. A setting of .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. This sensors accurate, non-contact temperature measurement ability is equally applicable to all other coating and painting applications.