GLOBAL LUGGAGE MANUFACTURER OVERCOMES THERMAL MANAGEMENT CHALLENGES WITH EXERGEN NON-CONTACT SENSORS

The Market Opportunity
The global market for luggage is growing at a brisk pace and is expected to reach an estimated value of USD $43.4 billion in 2020. As tourist and business traffic see a robust increase, expenditures on luggage, including suitcases, travelling bags, business and computer bags, will continue to grow as well.

The Manufacturing Process
Frequently, hard-sided luggage is manufactured using a process called vacuum forming (also known as thermoforming). During vacuum forming, a sheet of plastic, such as ABS Polycarbonate board, is heated to a forming temperature, stretched onto a single-surface mold, and forced against the mold by a vacuum. The heaters used in vacuum forming are generally infrared elements mounted within a reflector plate. To obtain the best vacuum forming results, it is essential that the plastic sheet is heated uniformly over its entire surface area and throughout its thickness. In order to achieve this, it is necessary to have a series of heating zones that are controlled by energy regulators. If the heat is not regulated properly, damage will occur to the plastics, and possibly to the machinery.

The Challanges
There are other common thermal management problems encountered in the vacuum forming process. Absorbed moisture can expand, forming bubbles within the plastic's inner layers. This significantly weakens the plastic. This problem can be solved by drying the plastic for an extended period at high but sub-melting temperature, but this heat, too, must be carefully monitored. Additionally, webs can form around the mold, caused by overheating the plastic and, this too, must be carefully monitored. A large luggage manufacturer in Taiwan was grappling with many of these problems and turned to Exergen Global for a solution. The manufacturer had previously measured the process temperature using contact sensors, but discovered that the sensors often touched the plastics, leaving a mark on the target. They also found that the contact sensors weren't fast or accurate enough to manage their diverse thermal challenges.

The Optimal Solution
Exergen Global recommended Exergen's IRt/c family of infrared non-contact temperature sensors. Exergen's IRt/c sensors are well suited to the application because they measure a zone rather than a specific and small point, providing more extensive target temperature information. The self-powered, intrinsically safe sensors offer repeatability of 0,01°C (0.02°F), resolution of approximately 0,0003°C (0.0005°F) and an interchangeability of +/- 1%, virtually guaranteeing that they can be used across all of the manufacturer's machinery without any variations in results.

Result
Using the Exergen IRt/c's, the manufacturer was able to establish a feedback loop that controls the timing of the heaters used in the process. This mechanism assures the quality is stable under changing ambient temperature conditions. Temperature variations in the processed plastic sheets are very quickly measured and kept under control using this method.

As a result of using the Exergen IRt/c sensors, the manufacturer has achieved much better control of process temperatures, thereby improving end product quality and safeguarding machinery. These safeguards have helped the manufacturer save time, material and money.

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