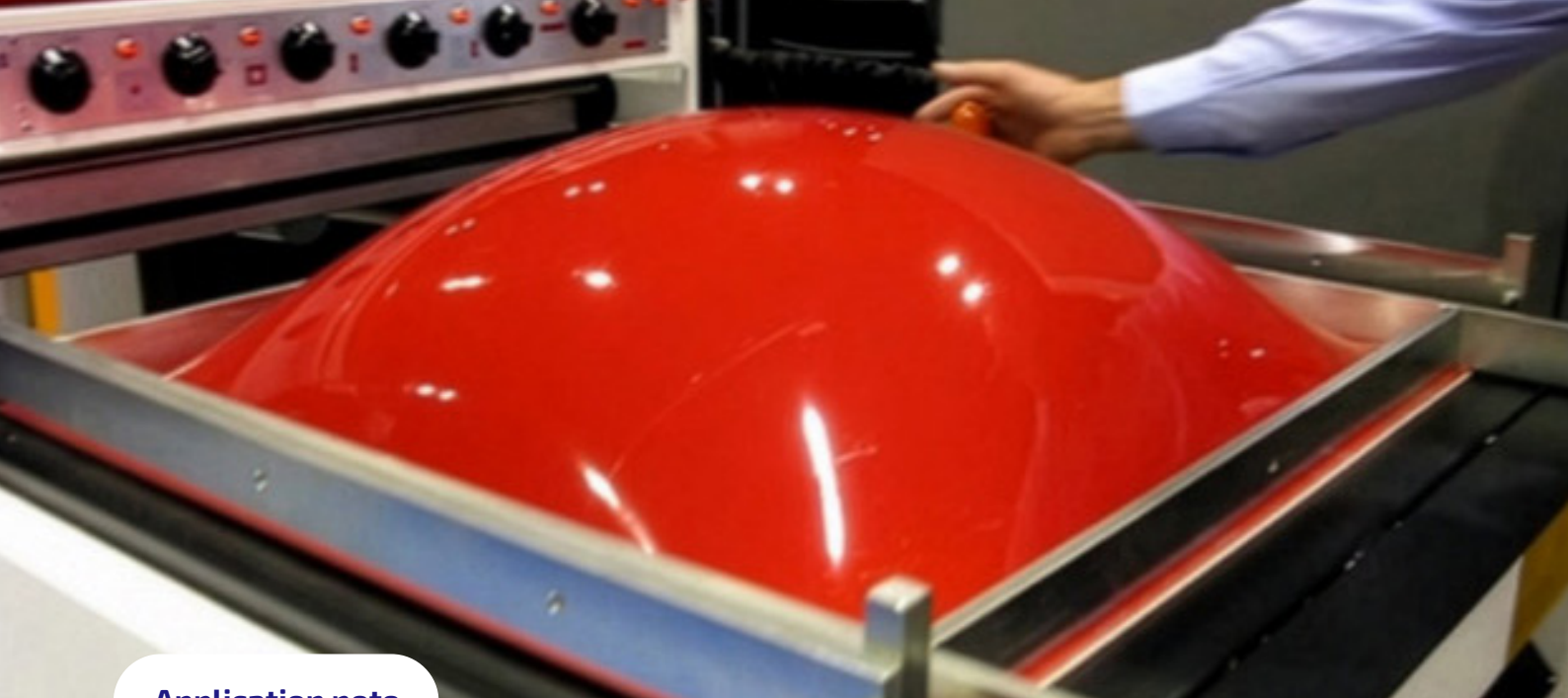




Application note

Optimizing vacuum thermoforming through precise temperature control

Sector

Plastic thermoforming and packaging manufacturing

Application

Plastic sheet temperature monitoring during forming

Product

Exergen non-contact IRt/c sensors

Vacuum thermoforming shapes heated plastic sheets into products ranging from food containers to automotive components. The process heats plastic until soft, drapes it over a mold, and applies vacuum to pull the sheet into shape. Success depends on heating the plastic uniformly across its entire surface and throughout its thickness to reach optimal forming temperature. Different plastics require different temperature ranges, making precise measurement critical for consistent quality and production efficiency.

Challenges

Processing plastic at optimal forming temperature requires measuring the actual sheet temperature, not indirect reference points. Contact sensors react too slowly for dynamic processes and can leave marks on the plastic surface. They could also become contaminated over time through repeated contact. Temperature variations across the sheet can cause quality issues, while ambient temperature changes affect process stability. Operators need a measurement solution that provides accurate readings without interfering with the product or slowing production.

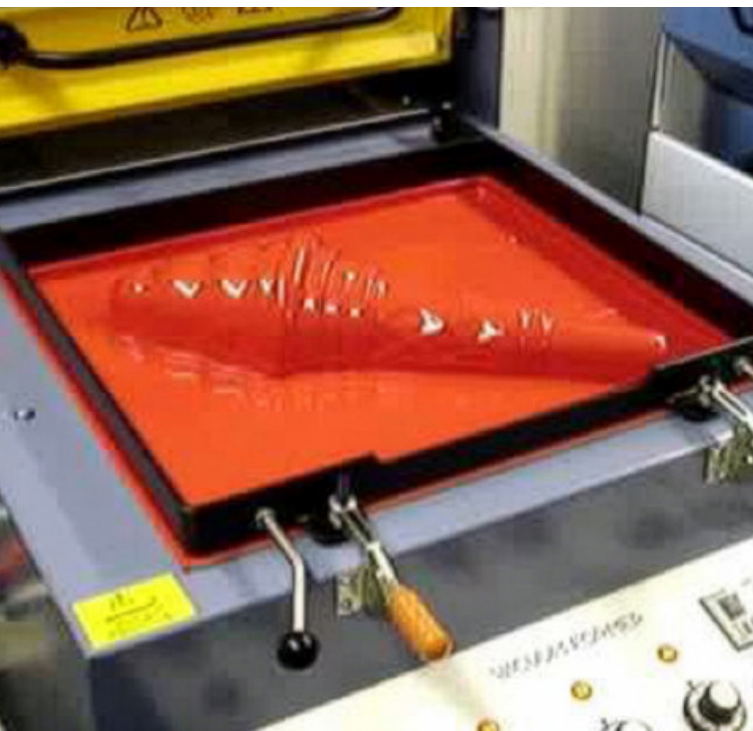


Solutions

Exergen IRt/c sensors enable non-contact measurement of actual plastic sheet temperature throughout the heating process. The sensors measure zones rather than single points, providing comprehensive temperature information across the plastic surface. A feedback control loop using sensor data adjusts heater timing to maintain stable quality despite changing ambient conditions. This approach controls temperature variations in processed sheets while maximizing throughput. The sensors mount easily in existing equipment without requiring process modifications.

Benefits

Non-contact measurement eliminates product marking and sensor contamination issues. As Exergen IRt/cs are passive devices, there is no drift and no need for programming or calibration. They offer high accuracy with a repeatability error of just 0.01°C (0.02°F) so can be quickly and easily replaced if necessary. Zone measurement also provides more complete temperature information than point sensors. The sensors operate reliably across varying ambient conditions, ensuring consistent process control. This combination of features helps manufacturers maintain quality while maximizing production speed.



Precise temperature control with Exergen sensors from CleverIR enables faster production speeds and higher quality in vacuum thermoforming operations.

Results

Integrating Exergen sensors transforms thermoforming process control and product quality. Operators can increase production speed confidently while maintaining consistent output quality. Reduced temperature-related defects improve yield and decrease waste. Better process stability under varying ambient conditions means fewer rejected parts during startup and environmental changes. The maintenance-free operation and drop-in replacement capability reduce downtime and service costs. These improvements

help manufacturers remain competitive in demanding markets.

Conclusion

Successful vacuum thermoforming requires precise temperature control across varying plastics and conditions. Exergen infrared sensors from CleverIR provide the accuracy, reliability, and ease of use needed to optimize both speed and quality. Their non-contact design and maintenance-free operation make them ideal for high-volume thermoforming environments.