Extrusion Coating

Manufacturing of beverage containers, packaging foils, and other multi-layer packing materials

Q Question

How can you detect waving edges and temperature gaps in the plastic film during the extrusion coating process?

How can proper web temperatures for strong film-to-paper adhesion be insured?

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A Answer

Situation Analysis

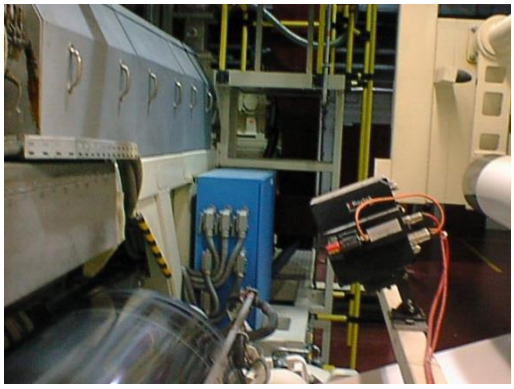
The packaging material for carton based packages is composed of a laminate of paper, polyethylene and aluminium foil. Paper makes the packages stiff. Plastic renders them liquid-tight, and aluminium foil blocks out light and oxygen.

The Polyethylene feeds through several extruders at temperatures preferably of up to 320°C. The melt is fed over wide slot die and laminated onto the paper.

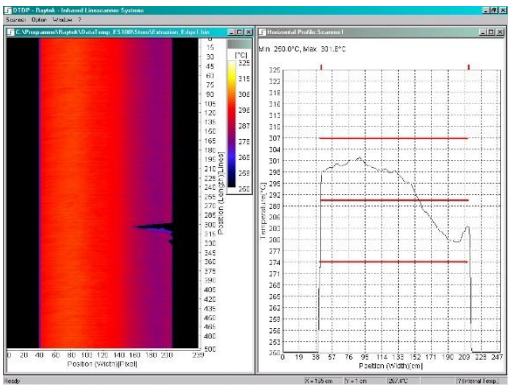
Temperature and viscosity variations in the local melt streams across the width of an extruder flow channel can cause “waving” edges, gaps, and edge-tears in the extruded film. In practice already 10 K temperature difference influences adhesion between the Polyethylene layer and the paper and the Polyethylene film can tear off when feeding from the extruder die.

The internal measurement of the melt temperature by use of thermocouples in the die is not representative for the temperature distribution in the Polyethylene film.

With the increase of the production speed (up to 700 m/min), there is an increasing need for improved quality control to ensure the functionality of beverage packing.



*The linescanner MP150 monitors the extruded film***



Thermal image with horizontal profile and “Automatic Sector”

Raytek®
Fluke Process Instruments

A

Answer

Solution and Improvements

The EC150 system is an automated surface inspection system for detecting, measuring, and classifying defects occurring in extrusion coating, co-extrusion and laminating processes.

Surface temperature measuring of the melt curtain supplies the information about available temperature distribution at the die exit. The EC150 measuring system offers a contact-less temperature measurement covering the entire width of the polyethylene film. The linescanner scans the melt curtain directly. For a better alignment the linescanner is equipped with a line laser.

The “Automatic Sector” feature, unique to EC150, continuously monitors the whole melt curtain and provides automatic edge detection. The “Automatic Sector” automatically adapts to measuring a plastic film of varying width. Temperature gaps or unacceptable “waving” or “edge running” are detected automatically.

Within the “Automatic Sector”, temperature deviations are calculated. Unacceptable edge waving, edge running, or edge tears from one scanned temperature line to the next line are detected quickly and automatically. If a fault or defect occurs, an alarm is triggered to allow for quick corrective action.

Raytek Product

EC150 System with
MP150P31 Linescanner

Accessories

- Adjustable Mounting Base
- Line Laser
- DataTemp EC150 Software

Benefits

- Detects waving edges and temperature gaps automatically
- Insures proper web temperatures for strong film-to-paper adhesion
- Improves process parameters and reduce scrap
- Automates quality documentation

References

- SIG Combibloc (Germany)

www.flukeprocessinstruments.com

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* Photo: courtesy of Tetra Pak GmbH & Co.
** Photo: courtesy of SIG Combibloc GmbH