Identifying and Correcting Common Process Issues in Film Coextrusion

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COMMON ISSUES

- Film Flow Lines
  - Port Lines, Die Lines, Haze Lines
- Melt Stability
- Gels
  - Unmelts, Degraded Gels, Crosslinked Gels
- Interfacial instability
  - Zig-zag instability, Wave instability
- Poor gauge
  - Thickness uniformity

FLOW LINES

- Port Lines
  - Processing temperatures
  - Temperature gradient
  - Screw and barrel conditions
  - Die design
- Die Lines
  - Dirty die lip buildup
  - Low MW oligomers
  - Processing temperatures
- Haze Lines
  - Processing temperatures
  - Temperature uniformity

MELT STABILITY

- Resin selections
  - Is there any materials with melt strength to help with the process
- Extruder sizing
  - Are the extruders too big or too small?
  - Melt temperature gradient present?
- Screw design
  - Good melt temperature control
  - Output and pressure stability
- Product layflat and blowup ratios
  - Can the materials being processed achieve the layflat desired

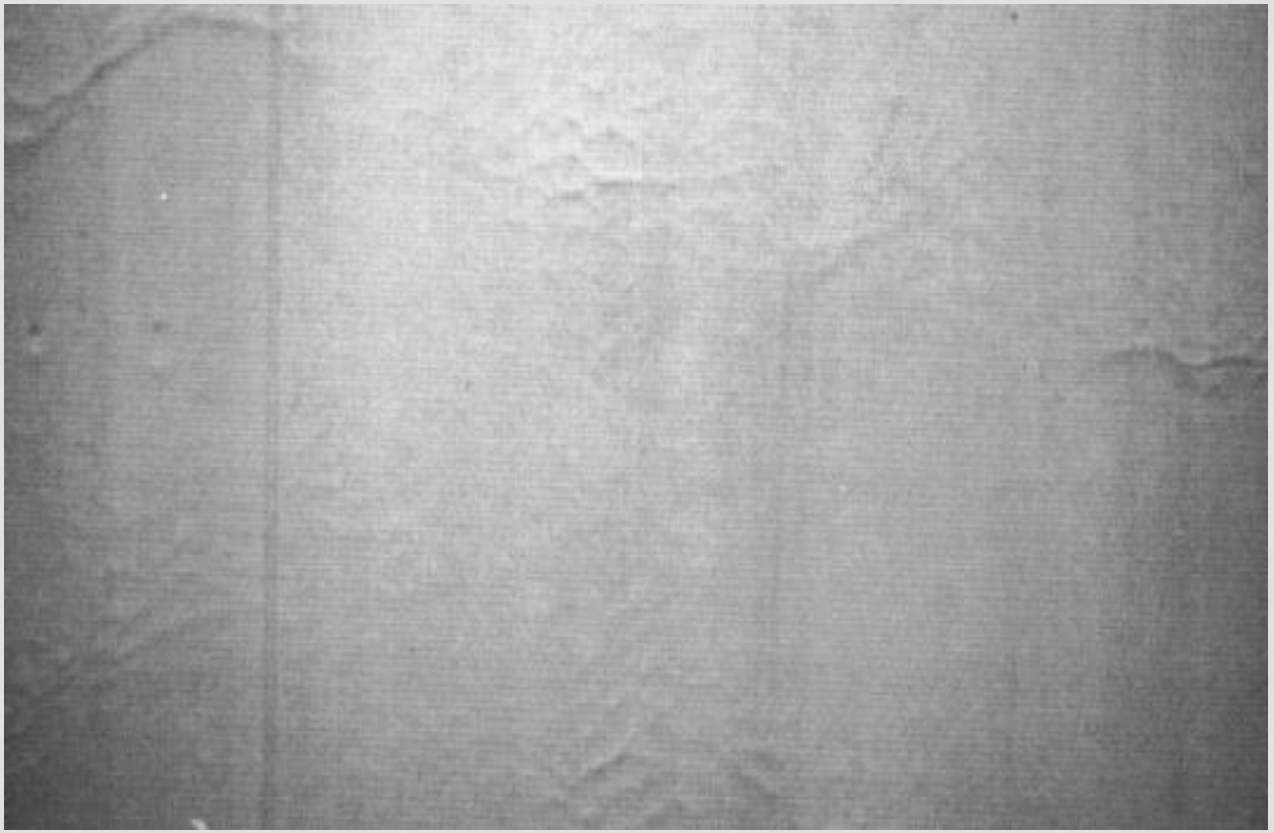
GELS

- Identify type of gels
  - Degraded or crosslinked gels, unmelts, contamination (fiber or other resins in the system)
- Which layer(s) exhibit gels?
- Degraded/crosslinked Gels
  - Melt temperature control
  - Melt temperature gradient
  - Screw design
  - Screw RPM
  - Die design
  - Barrel and screw conditions
  - Any potential for resin contamination

GELS
(CONTINUED)

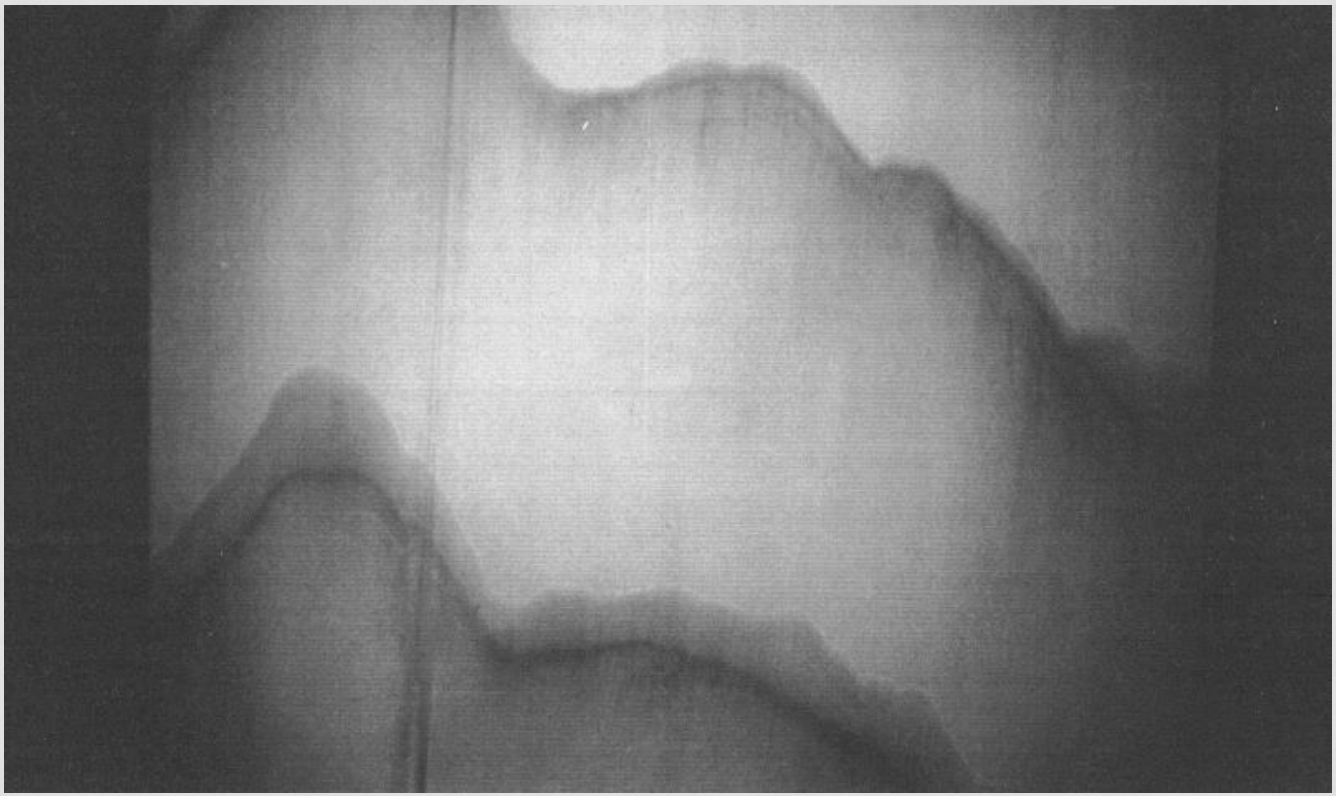
- Unmelts
  - Identify the unmelted resin (PE, PP, PA, EVOH etc)
  - Is the unmelted resin the same as the resin being processed?
    - If no ➔ resin contamination
  - If true unmelt:
    - Process temperatures
    - Screw design
  - Resin blend compatibility
- Resin contamination
  - Proper purging of the resin conveying system
  - Any fiber contamination from resin bags

INTERFACIAL INSTABILITY



Zig-zag – viscosity mismatch

INTERFACIAL INSTABILITY



Wave type – elongational viscosity differences between layers

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INTERFACE INSTABILITY

- Identify the type of instability – whether zig-zag or wave type
- Identify which interface it is coming from – possbily more than one interface
- Using process of elimination – change one parameter at a time:
  - Temperature and output changes are the first steps to start
  - Also need to make sure that there are no pressure or output stabilities
- Can be minimized with proper resin selections and die design

POOR GAUGE

- First step in troubleshooting is to obtain a gauge plot
- If the bubble is offset in blown film – need to do bolt adjustment to make sure that the die is round to start with
- Check for temperature gradient – a large temperature gradient can contribute to poor thickness uniformity
- Adjust outputs to see the effect of temperature on thickness uniformity
- Screw and barrel conditions
  - Need to make sure that there is no excessive temperature gradient caused by worn barrel and screws
- Die design
- IBC and air ring design and conditions
- Local ambient temperature
- Hardware failure (Heater bands, T/C's)

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BASIC CHECKLIST

	Processing Temperatures	Screw and Barrel Conditions	Resin Selection	Die Design	Screw Design	Air Ring & IBC Conditions
Crosslinked Gels	X	X	X	X	X	
Unmelts	X		X		X	
Gauge	X	X		X		X
Interfacial Instability	X		X	X	X	
Flow Lines	X	X	X	X	X	
Melt Stability	X	X	X			X

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Contact Macro Technology to Help You Improve Your Process and Increase Your Profits

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