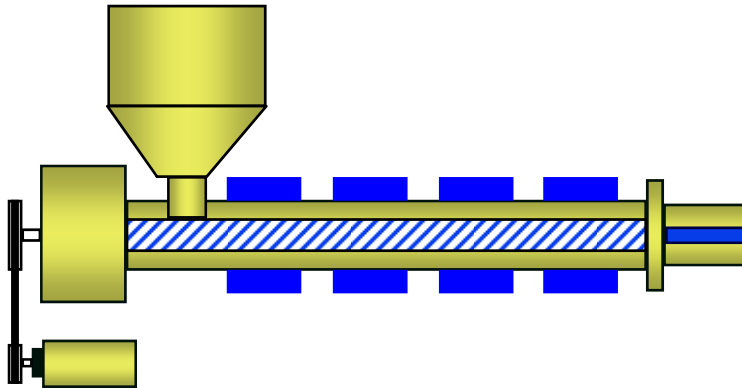


Troubleshooting the Extrusion Coating Process

Chevron Phillips Chemical is pleased to offer useful extrusion coating troubleshooting tips. However, due to the complexity of production and manufacturing, these tips should be used only as rough guidelines and suggestions. Implementation of any of these troubleshooting tips could affect the finished properties of the final product and should never be implemented without proper safety considerations. Further, they are not a substitute for your own expertise.

Philosophy

Most experts agree that breaking down the components of an extrusion coating process is the best way to troubleshoot it.





Troubleshooting List

- ◆ Adhesion
- ◆ Gauge Profiles
- ◆ Gels & Voids
- ◆ Edge Tear
- ◆ Pinholes
- ◆ Sealability
- ◆ Applesauce
- ◆ Die Lip Build-up

Troubleshooting Adhesion

Causes

- Melt Temp too Low
- Melt Temp too High
- Line speed too High
- Air Gap too Low
- Air Gap too High
- Pretreatment not effective (flame, corona or wet priming)

Solution / Effect

- Raise melt temp to increase surface oxidation and/or lower viscosity.
- Lower melt temp to avoid thermal degradation.
- Reduce line speed to increase time in the airgap (increase surface oxidation).
- Increase air gap to increase surface oxidation.
- Decrease air gap to avoid premature cooling of extrudate.
- Calibrate and/or inspect flame or corona treated. Increase treater setting or move treater closer to die. Poor primer coverage, poor primer drying, or low percent solids.



Troubleshooting Adhesion

Causes

- Low Surface Oxidation
- Nip Pressure Too Low
- Nip Impression not Uniform
- Improper Resin Selection
- Web Tension Too High
- Poor Melt Quality (cause of spotty adhesion)

Solution / Effect

- Consider ozonation as pretreatment.
- Increase nip pressure.
- Perform nip impression test and repair.
- Check with resin manufacturer for compatibility to substrate.
- Reduce web tension to avoid opening nip.
- Reduce delta T by improving mixing. Generate higher back pressures (valve or screen pack), install static mixer, replace worn screw, or improve screw design.



Troubleshooting Gauge Profiles

Causes

- Poor Melt Quality
- Die out of Adjustment
- Die Gap too wide
- Poor die temperature control
- Substrate

Solution / Effect

- Reduce Delta “T” by improving mixing. Generate higher back pressures (valve or screen pack), install static mixer, replace worn screw, or improve screw design.
- Adjust die bolts or tune automatic profile control. Check for bad heaters in dies with APC control. Clean die body and land area.
- Decrease die gap to build die pressure
- Check for bad heaters or bad thermocouples
- Analyze substrate for C/D & M/D profile variation



Troubleshooting Gauge Profiles

Causes

- Non-steady extruder output..
- Excess melt temperature

Solution / Effect

- Reduce rear temperature zones. Check for insufficient cooling in feed throat, extruder screw, and Barrel zones 1 & 2. Check lb/hr/RPM
- Reduce melt temperature to increase melt viscosity



Troubleshooting Gels and Voids

Causes

- Wet Polymer
- Contaminated Resin
- Thermal Degradation
- Poor Mixing in Extruder
- Oxidized Resin

Solution / Effect

- Check resin for surface moisture.
- Inspect incoming polymer for foreign matter and odd looking pellets.
- Reduce melt temperature, check for over riding temperature zones. Check for manufacturers recommended melt temperature.
- Increase back pressure, use tighter screen packs, consider new screw design.
- Contact resin supplier, send 50 lb. of resin and gel samples immediately.



Troubleshooting Edge Tear

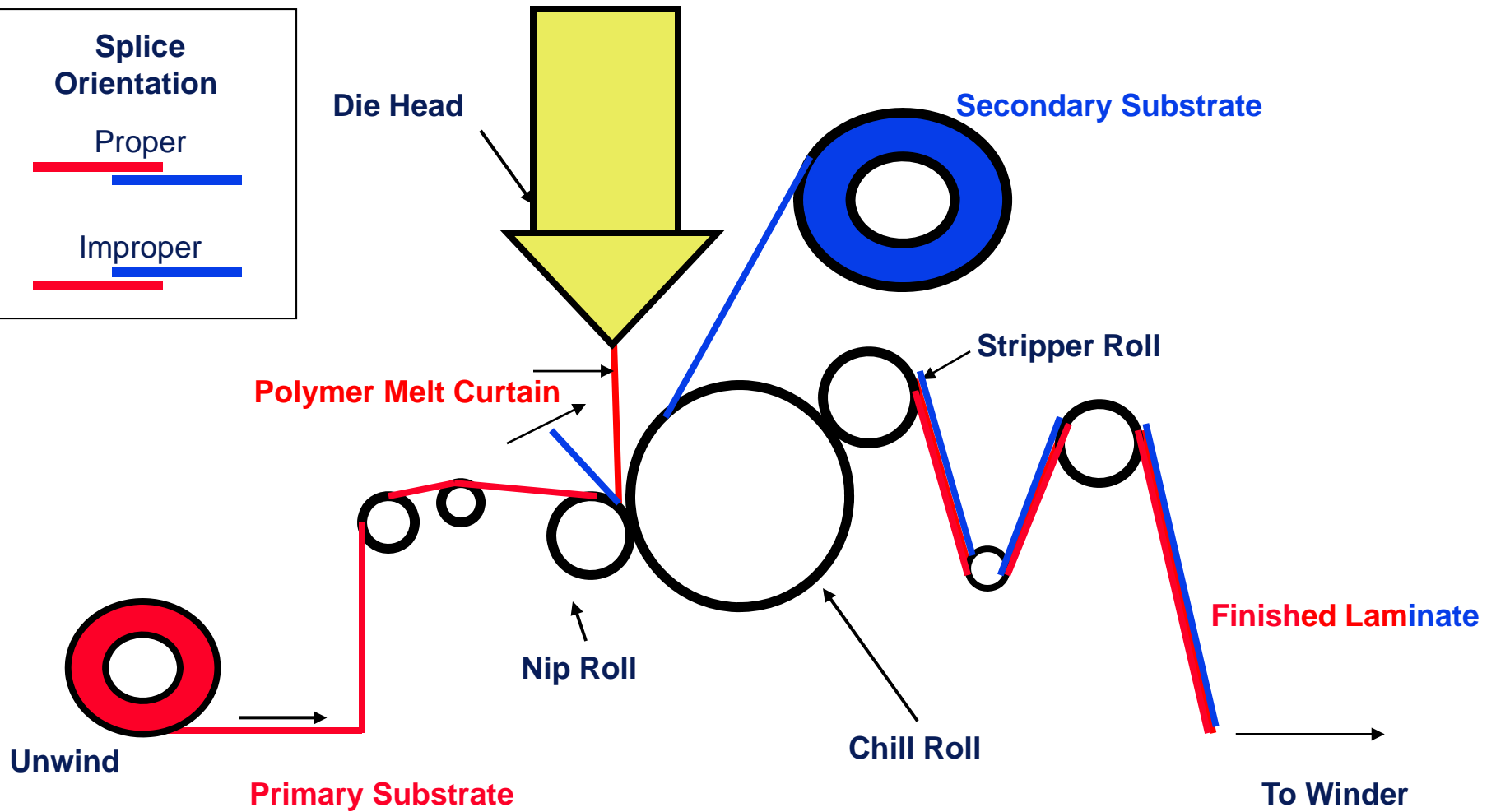
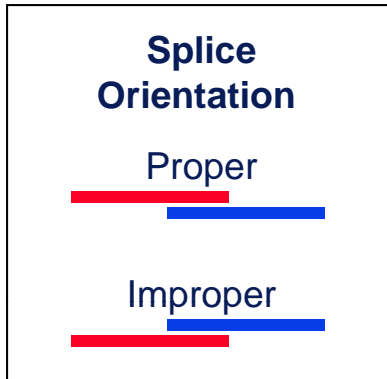
Causes

- Low Melt Temperature
- Melt index too low for coating weight
- Edge Bead Reduction over set
- Draw Ratio Too High
- Splicing

Solution / Effect

- Increase resin melt temperature
- Use resin with higher melt index
- Decrease off set between internal deckle settings.
- Decrease die gap, Increase coat weight.
- Reverse splice direction or implement mechanical solution

Splice Orientation



Troubleshooting Pinholes

Causes

- Excessive Melt Temperature
- Substrate Roughness
- Coat weight too light
- Gels in Extrudate
- Excess corona treatment
- Dirty web handling
- Lower resin viscosity
- Too High of Air Gap

Solution / Effect

- Reduce Melt temperature
- Use Flame treater to “burn off” fibers. Employ smoother substrate.
- Increase coating weight
- Inspect Pinhole for assignable cause
- Reduce Treatment level or clean treater unit.
- Inspect and clean idlers
- Employ lower melt index resins
- Reduce air gap



Troubleshooting Sealability

Causes

- Excessive Oxidation
- Additives
- Poor sealing conditions
- Improper resin selection

Solution / Effect

- Decrease resin melt temperature or lower air gap.
- Slip additives or other blooming agents can contaminate seal surface
- Increase sealing temperatures or dwell times.
- Check with manufacture for heat sealing information

Troubleshooting Applesauce

Causes

- Excessive melt temperature
- Poor mixing or melt quality
- Contamination
- Interfacial instability in co-extrusion

Solution / Effect

- Lower melt temperature to reduce degradation.
- Increase back pressure or use tighter screen packs
- Check for foreign matter or odd appearing pellets in feed hopper.
- Compare rheology of coextruded resins

Troubleshooting Die Lip Build-up

Causes

- Excessive melt temperature
- Excessive swell
- High additive loading
- Melt sticking to metal die lip surface
- Melt scraping against die lip

Solution / Effect

- Lower melt temperature to reduce degradation.
- Increase die gap, lower output, increase die lip temperature, add flow promoter and/or switch to a higher melt index resin to lower shear at the die lip.
- Consider reduction in additive levels
- Coat metal surfaces with low surface energy coating.
- Adjust angle at which melt is contacting chill roll.