# Troubleshooting Blown Film Extrusion Operations

By: Chris Rauwendaal and Paul Waller

**Day 1, Chris Rauwendaal**

1. **Introduction and extruder hardware**
   - Basic extruder components
   - Review of terminology
   - Screw and barrel
   - Feed system
   - Screw drive
   - Heating and cooling
   - Instrumentation and control

2. **Plastic properties**
   - What are plastics?
   - Plastics used in extrusion
   - Melt flow properties
   - Thermal properties
   - Viscous heat generation
   - Plastic quality control

3. **What happens inside the extruder?**
   - Feeding
   - Solids conveying
   - Plasticating
   - Melt conveying and mixing

4. **Extruder screws**
   - Standard extruder screw
   - Variations on standard screw
   - Mixing screws
   - Barrier type extruder screws

5. **Blown film dies**
   - Side fed dies
   - Bottom fed dies
   - Spiral mandrel dies
   - Coextrusion dies
   - Oscillating dies

6. **Operational principles**
   - Startup procedures
   - Purging and changeover
   - Shut down procedures

**Day 2, Paul Waller**

7. **Downstream equipment**
   - Comparison air ring systems
   - Optimizing air ring setup
   - Internal bubble cooling systems
   - Automatic gauge control
   - Bubble stabilizer systems
   - Effect collapsing systems on gauge variation and roll geometry
   - Surface treatment and limitations
   - Web tension control and optimization
   - Heat sealing and bag manufacturing

8. **Troubleshooting**
   - Requirements for efficient troubleshooting
   - Tools for troubleshooting
   - Systematic troubleshooting
   - Polymer degradation
   - Extrusion instabilities
   - Bubble instabilities
   - Air entrapment and gel problems
   - Die lines
   - Poor optical properties
   - Extrusion instabilities
   - Wear problems
   - Interfacial instabilities

9. **Workshops**
   - Eliminate melt fracture
   - Eliminate interfacial instability
   - Eliminate gels
   - Control bubble instability
   - Diagnose surface adhesion problems
   - Diagnose and eliminate wrinkles
   - Optimize heat seal strength
   - Diagnose and minimize gauge variation
   - Extruder temperature profiles
   - Diagnose and eliminate extruder surging
   - How to adjust for screw and barrel wear

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Books are offered at a discount only if ordered with a seminar and will be delivered at the seminar.
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<th>Course</th>
<th>Prior to April 20</th>
<th>April 20-May 4</th>
<th>After May 4</th>
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<tr>
<td>Blown Film Troubleshooting</td>
<td>$795.00</td>
<td>$850.00</td>
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<tr>
<td>Sheet Extrusion:</td>
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<td>Foam Extrusion</td>
<td>$1095.00</td>
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3rd attendee discount (5%):

- Understanding Book: $60.00
- Troubleshooting Book: $105.00
- Polymer Extrusion: $105.00
- Polymer Mixing: $70.00
- SPC in Injection Molding and Extrusion: $105.00
- Thermoplastic Foam Extrusion: $70.00
- A Practical Guide to Blown Film Troubleshooting: $125.00

Total:

A 5% discount will be given for the 3rd and up attendees from the same company. The course fees include lunch for each day and the handout material.

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