Tubing & Profile Extrusion Seminar

At Harrel, Inc. E. Norwalk, CT
Course Leader: Chris J. Rauwendaal
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Introduction
- Basic extruder components
- Screw, barrel, and feed system
- Grooved feed extruders
- High speed extruders
- Screw drive systems
- Breaker plate and screens
- Gear pumps
- Heating and cooling
- Instrumentation and control

Important polymer properties
- Melt flow properties
- Thermal properties
- Viscous heat generation
- Optimizing process conditions
- How to set process conditions

Requirements for efficient extrusion
- Efficient machinery
- Efficient operation
- Efficient changeover
- Maintenance
- Resin quality
- Training
- Statistical process control
- Design of experiments
- Data acquisition system
- Instrumentation and control

Functional aspects
- Solids conveying
  - Feeding methods
  - Gravity induced conveying
  - Drag induced conveying
  - How to improve solids conveying
- Plasticating
  - Contiguous solids melting
  - Dispersed solids melting
  - How to improve melting
- Melt conveying
  - Drag flow
  - Pressure flow
  - Leakage flow
- Mixing
  - Basic mechanism of mixing
  - Distributive mixing
  - Dispersive mixing
  - How to improve mixing
- Energy efficiency
  - Measuring energy efficiency
  - Preheating the resin
  - Starve feeding
  - Screw design

Screw Design
- Standard extruder screw
- Barrier type extruder screws
- Multi-stage screws for venting
- Mixing screws

Die Design
- General rules and guidelines
- Methods of flow balancing
- Types of extrusion dies
  - Profile dies
  - Tubing dies
  - Other types of dies
- Analysis of dies
- Coextrusion dies
- Case studies of die design

Startup and Service of extruders
- Initial check-out
- Quick electrical checks
- Service tips

Laboratory Day 1
During this demonstration you will have the opportunity to actually string up and operate a tubing line. For tutorial purposes, operation will be manual, so that you can see how each of the adjustments on the line affects the final properties of the tubing.
After the regular laboratory session there will be a demonstration of "direct extrusion". Using patented mixing techniques, recently developed by Dr. Rauwendaal, the functions of mixing additives and of precision extrusion, which formerly required a twin screw extruder plus a single screw extruder can now be accomplished totally within a single screw extruder (or MIXTRUDER)

Laboratory Day 2

Similar to Day 1. Except that this time you will be using free air extrusion to make bump tubing on a state-of-the-art line. Both outer diameter and wall thickness of both large and small tubing sections will be under automatic control. You will also be using the latest in Statistical Quality Control (SQC) techniques to monitor the quality level of the tubing.

After this laboratory session there will be a demonstration of the new ALTERNATE POLYMER extrusion system, whereby the polymer varies seamlessly from 100% polymer A to 100% polymer B along the length of the tube.

Afternoon Day 3
The seminar officially ends at 1 p.m. However, participants are invited to remain as long as desired to get additional hands-on experience and to discuss special problems and applications.