



ProEx 1 Extrusion

Seminar outline

CERTIFICATION SEMINAR

Duration - 5Days

Paulson's comprehensive, real-world ProEx 1 Extrusion seminar offers immediately actionable skills for extrusion

production floor personnel at any level of experience.

Gain critical knowledge and skills, thorough understanding the extrusion process from a scientific point of view.

Day 1

Introductions

Quiz for Benchmarking

Course Goals

Module 1 – Brief History of the Origin of Plastics

Module 2 – The Structure of Plastic Raw Materials

- Polymerization

- Molecular Weight & Molecular Weight

- Distribution

- Thermoplastics and Thermosets

- Polymer Structure

- Crystalline and Amorphous Structures &

- Processing Requirements

Module 3 – The Characteristics of Plastics for Extrusion

- Homopolymers, Copolymers and Terpolymers

- Blends and Alloys

- Raw Material Forms

Plastic Degradation

Additives

Moisture in Plastic

Contamination

Module 4 – The Effects of Pressure, Temperature and Flow

Plastic Flow Behavior

Molecular Orientation

Viscosity

Fluid Flow Behavior – Types of Fluid Flow

Measuring Plastic Flow Behavior

Effects of Additives and Regrind on Viscosity

Day 2

Module 5 – The Single Screw Extruder – Parts and Operations

Parts of the Single Screw Extruder

Screen Pack

Die Manifolds/Adaptors

Extruder Valve

The Extrusion Process

Module 6 - Extrusion (Gear) Melt Pump Parts and Operation

Why a Melt Pump?

Parts of the Melt Pump

Operation and Control of Melt Pump

Module 7 – Optimizing Extruder Controls – Part One

Process Variables

Plastic Raw Material Properties

Plastic Flow in the Hopper

Plastic Behavior in the Feed Zone

How Plastic Melts and Flows

Module 8 – Optimizing Extruder Controls – Part Two

The Compression/Transition Zone and Operating
Variables in that zone

The Metering Zone and Operating Variables in
that zone

Day 3

Module 9 – The Sheet Extrusion Line: Parts and Operation

Sheet Thicknesses and Uses

- Parts of the Sheet Line
 - Module 10 – Sheet Extrusion Dies
 - Sizes and Construction
 - Parts of the Sheet Die and Assembly
 - Sheet Die Temperature Control
 - Restrictor Bar
 - Die Lips and Die Gap
 - Deckle Bars
 - Plastic Behavior and Flow in the Die
 - Care of Dies
 - Module 11 – Controlling Plastic Flow in the Die
 - Manifold Designs
 - Controlling Plastic Flow Through Die Adjustments
 - Module 12 – Coextrusion
 - Definition
 - Methods
 - Module 13 – The Roll Stack
 - Purpose
 - Designs
 - Drive, Nip and Roll Gap
 - Roll Finish, Construction, Temperature Control and Cooling Capacity
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Day 4

- Module 14 – After the Roll Stack
 - Trimmers
 - Gauging System
 - Secondary Cooling
 - Static Discharge
- Module 15 – Plastic Behavior in the Sheet Extrusion Line
 - Plastic Leaving the Die
 - Plastic Travel Through the Roll Stack
 - Pressure on the Plastic in the Roll Gap
 - Cooling
 - Uniaxial and Biaxial Orientation
 - Control of the Sheet Line
- Module 16 – Safety, Pre-Start and Start-up Procedures
 - Importance of Safety
 - Potential Hazards
 - Pre-Start Procedures

Start-Up
Steady State Procedures
Module 17 – Steady State Operation, Shutdown, and
Maintenance Procedures
Steady State Operations
Shutdown Procedures
Emergency Shutdown and Startup After an
Emergency Shutdown

Day 5

Module 18 – Single Screw Extruder Sheet Extrusion
Troubleshooting
Set-up Sheet
Basic Steps
Common Extrusion Problems
Final Exam and Review

Note: There are reviews at the end of each module and an overall review prior to the final exam.

Paulson Plastics Academy, a division of Paulson Training Programs, Inc., is the place to learn both the fundamentals and advanced strategies of plastics manufacturing and scientific injection molding in an expert instructor led classroom environment. Classes are vendor-neutral and culminate in a powerful certification to help each attendee go further in their career. Each seminar teaches how to optimize plastics processing for injection molders, extruders, blow molders or thermoformers.

Seminars are held in multiple, state-of-the-art technical facilities nationwide including: Arburg, MGS, Toshiba-Shibaura, Polymer Center of Excellence, MoldTrax, and Hennepin. Explore and learn how you can become a skilled plastics processor.
