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Intermediate Extrusion **Pipe, Profile or Sheet**

Aim of the Programme

This programme is aimed at people who undertake a technician type role. Ideally, the attendee will have been working in the process for a period of time or will have already undertaken some formal training to ascertain the basic fundamentals of the process. It will build on prior knowledge and focus on the efficient setup, correction and improvements of a given process.

Objectives of the Programme

- Understand the complete manufacturing process
- Work in a safe manner in relation to the machine
- State which machine would be most suitable for a product or output
- Understand how design affects process issues & production costs
- Improve the interaction of ancillary equipment into the process
- Undertake quality procedures to monitor the process in line with quality specifications
- Understand the processing differences of different Polymers compounds and make suitable changes or recommendations.
- Understand how different Polymers influence product quality and product handling
- Explain how and why the Die is manufactured in a particular way
- Set up a Extrusion line to a given standard and discuss how this operation could be optimised
- Start up and shut down an Extrusion Line whilst applying best practice within the industry
- Identify the root cause of extrusion process problems
- Monitor and make process improvements to a product

Content

Overview

- Review of fundamental principles

Machine

- Screw geometry and fill
- Barrel temperature settings
- Function and monitoring of barrel vacuum
- Creation, Stabilisation and monitoring of melt pressure
- Creation and monitoring of melt temperature

Polymer Compounds

- Types and Structures
- How polymers affect extrusion quality
- Processing, effects on different polymers
- Polymer problems during processing
- Product problems after extrusion & in service
- Plastic Flow along the screw and through the Die
- Wall thickness & flow adjustment
- Shrinkage
- Molecular Orientation
- Effects of moisture
- Problems caused by shrinkage
- Stress related problems
- Additives, their effect during moulding
- Cooling rates and characteristics

Dies, Calibrators and Cooling

- Die cost
- Die design variation
- Die and Calibrator/cooling terminology
- Materials used for Die and Calibrator manufacture
- Die heating, methods and control
- Cooling; location, construction methods & effects on product quality
- Co-extrusion and post die processes
- Die attachment and alignment
- Breaker plates, screens and/or choke rings
- Calibrator/cooling attachment and alignment
- Vacuum and pressure sizing
- Cooling by immersion, spray or contact
- Wall thickness influence on output and product shape

- Printing/marking
- Haul off set-up and optimisation
- Cutting and collection of product

Practical Setting of an Extrusion Line

- Set-up of a production machine from "standing" parameters
- Systematic start-up of the Extrusion Line
- Production of parts to specification & at optimum efficiency

Processing & Problem Solving

- Fundamental problems with the Extrusion process
- Product Faults: Cause & cures.
- Faults related machine selection
- Faults related die design and setting
- Faults related product design
- Faults related to material
- Use of recycled material
- Systematic Troubleshooting Techniques
- Process validation
- Continuous improvement

Safety

- Processing hazards
- Purging
- Fumes
- Incompatible materials
- Safe working practices/hygiene
- Solvents and Cleaners

Attendees

This programme is ideal for:

- Anyone who wishes to improve their knowledge of the process
- Setters/Technicians
- Trainee Setters

Programme Timetable

Guide Course Schedule (May change dependant on company requirements)

Day 1

Introduction
Review of key principles of extrusion
Machine, die and calibrator, polymer compounds
Safety
Process machinery

Day 2

Machine configurations
Operator/machine interaction
Die assembly and attachment
Polymer compounds

Day 3

Practical set up and optimization of machine
Processing problems and solutions
Quality principles, measuring and monitoring

Day 4

Practical Problem solving
Final assessment

At the beginning and end of each day a review of subject matter and a questions and answers session will take place to ensure that all subject matter has been fully embedded.