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## **Intermediate Injection Moulding**

### **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 discipline for a period of time or will have already undertaken some formal training to ascertain the basic fundamentals of the process. It will build upon 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 component
- Understand how design affects mould & 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 Polymer and the implications to product quality
- compounds and make suitable changes or recommendations
- Explain how and why a mould is manufactured in a particular way
- Set up a Injection moulding machine to a given standard and improve if practical
- Start up and shut down an Injection moulding whilst applying best practice within the industry
- Identify the root cause of moulding problems
- Monitor and make process improvements to a component

## Content

### Overview

- Review of fundamentals principles

### Machine

- Screw geometry
- Specific pressures
- Clamp force calculations
- Pressure v's resistance

### Polymer Compounds

- Types and Structures
- How polymers affecting moulding quality
- Processing, effects on different polymers
- Polymer problems during processing
- Product problems after moulding & in service
- Plastic Flow in relation to moulding
- Wall thickness & flow ratio
- Shrinkage
- Molecular Orientation
- Effects of moisture
- Problems caused by shrinkage
- Stress related problems
- Additives, their effect during moulding
- Cooling rates and characteristics

### Moulds

- Mould costs
- Manufacturing methods
- Materials used in mould design
- Cavitation & clamping requirements
- Mould terminology
- Mould Types & designs
- Hot Runner moulds; advantages & disadvantages
- Cooling; location, construction methods & effects on product quality
- Cores & side actions.
- Mould alignment
- Venting
- Gate position; type; size, how many?
- Runner systems; balanced, dimensioning
- Wall thickness & flow ratio

- Surface treatments; plating, surface finishes/ textures
- Draft angles & line of draw
- Ejection Systems
- Hydraulic & mechanically operated cores and side actions
- Unscrewing moulds: continuous internal threads
- Collapsible cores & expanding cores

### **Practical Setting of a Moulding Machine**

- Set-up of a production machine from zero parameters
- Systematic start-up of the Injection moulding machine
- Production of parts to specification & within cycle

### **Processing & Problem Solving**

- Moulding Faults: Cause & cures.
- Fundamental problems in Moulding
- Faults related machine selection
- Faults related mould design
- 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
- 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 injection moulding  
Machine, mould tool, polymer compounds  
Safety  
Process machinery

Day 2

Machine configurations  
Operator/machine interaction  
Mould tool  
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.