

Fundamentals of Injection Mold Design

About the Seminar:

This comprehensive two day technical seminar was developed to provide engineers and other technical personnel a state-of-the-art guide to designing and building injection molds. Critical areas addressed include the molding cycle, mold classifications, the cavity and core, runner and runnerless molding systems, plastic part analysis, mold materials and cost factors. Though some theory is included, emphasis is placed on best practice and selecting the proper technologies for your mold. This popular and informative course has been attended by more than 1000 students.

Who Should Attend:

Anyone working with the mold design and building process can benefit from this highly instructional course. This includes product design and process engineers, manufacturing, QA/QC, plastics and tooling engineers, as well as sales/service, purchasing, maintenance and management personnel.

Benefits of Attending

- ▶ Learn the various types of molds and design concepts that best fit your products
- ▶ Master the terminology and mold classifications used in the mold industry
- ▶ Understand how to select the best mold materials, finishes, plating and coatings
- ▶ Acquire techniques for balancing the mold and controlling temperature
- ▶ Troubleshoot and analyze failure and identify practical solutionse
- ▶ Learn the factors that determine mold making and part costs

Concepts Covered

- ▶ The Molding Cycle – Mold Classifications
- ▶ Nomenclature and Function of Mold Components
- ▶ Mold Details – Design Steps – the Cavity and Core
- ▶ Runner Systems – Conventional – Runnerless – Gate Types
- ▶ Temperature Control – Vents – Ejector Systems – Interlocks
- ▶ Mold Actions and Undercuts – Unscrewing Molds
- ▶ Shrinkage of Plastics and Rates – Plastic Part Analysis



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Course Syllabus

DAY 1

The Molding Cycle

- Injection
- Cooling
- Ejection
- Reasons for Type of Mold

Mold Classifications

- SPI Class 101
- SPI Class 102
- SPI Class 103
- SPI Class 104
- SPI Class 105

Factors in Cost of the Mold

- Design
- Mold Base
- Materials
- Runner System
- Components
- Labor

Types of Mold Bases

- A, B, T, X
- Unit
- Unscrewing
- Shuttle
- Stack
- Special

Starting the Mold Design

- Data
- Solid Model
- Design Steps
- Views in Mold Design

Nomenclature of the Mold

- Components
- Guide Systems
- Locating Systems
- Sprue Bushing
- Interlocks

Mold Details

- Width
- Length
- Height
- Plate thickness
- Standard Numbering System

Cost of Molding a Part

- Material
- Hourly Rate
- Labor
- Overhead
- Sales and Administrative
- Costs
- Profit

Design Steps

- Parting Lines and Types
- Surrounding with Steel
- Ejector Locations
- Plates and Applications

Cavity and Core

- Inserts
- Number per Block
- Determining Ejector Side

Draft

- Direction
- Reason
- Degree
- Application Rules
- Role in Ejection

Identifying the Mold

- Zero-Zero Corner
- Cavity Identification
- Component Identification

Cavity and Core

- Placement
- Usable Mold Area
- Cavity and Core Press
- Mounting Methods

Conventional Runner Systems

- Full Round
- Half Round
- Trapezoidal
- Efficiencies

Gate Styles

- Sprue
- Edge
- Overlap
- Submarine
- Cashew
- Tab
- Fan
- Film Diaphragm
- Pin Point
- Ring

Runnerless Molding Systems

- Internally Heated
- Externally Heated
- Manifolds
- Bushings
- Drops
- Valve Gates

DAY 2

Balancing the Mold

- Feed Systems
- Cooling
- Pressures

Temperature Control (Cooling)

- Principles
- Flow Variables
- Channels
- Baffles
- Bubblers
- Pitch Distances

Plastic Part Analysis

- Flow
- Cooling
- Warpage
- Shrinkage

Venting the Cavity

- Parting Line Vents
- Inserts
- Ejector Pins
- Cores

Ejector Systems

- Conventional Pins
- Blade Ejectors
- Sleeves
- Stripper Plates
- Air Poppets
- Failure Modes

Mold Interlocks

- Tapered
- Straight
- Integral
- How to Place

Shrink Rates

- Calculations
- How Plastics Shrinks
- General Rates
- Importance of Steel Safe

Mold Materials

- Mold Base
- Cavity
- Core
- Criteria
- Hardness
- Thermal Conductivity
- Polishability

Cavity Finish

- Finish Types
- Texturing
- Engraving
- Plating and Coatings

Mold Detailing

- Plan Views
- Short Section
- Long Section
- Bill of Materials

Mold Actions

- Undercuts
- Mechanical Slide Action
- Hydraulic Side Cores
- Lifters
- Unscrewing Cores
- Collapsible Cores
- Wedges
- Multiple Slides
- Expandable Cavities

Strength of Mold

- Formulas
- Side Walls
- Bending
- Flexing
- Component Failure