



## SmartTech™ Scientific Optimization Pro (2 Days)

This package provides participants with a higher level of understanding of Scientific Molding: the ideal training for advanced employees, such as process technicians and engineers.

SmartTech™ Scientific Optimization Pro's expert-level 2-day training is perfect for anyone involved in developing, establishing, evaluating, and optimizing the scientific molding process.

The SmartTech™ Scientific Processing Pro program combines:

- Pre-Requisite Online Training
- Face-to-Face Instruction
- Hands-On Skills Development
- Post-Requisite Online Training
- SmartTech™ Scientific Optimization Pro Completion Exam

### Prerequisite Online Training

- Processing Parameters for Scientific Molding
- Math for Scientific Molders

### Prerequisite Learning Objectives

- Understand safety precautions around the molding machine
- Understanding the Machine Control Panel
- Understand the purpose and importance of a process log
- Understanding closed-loop process control systems
- Establishing an efficient Scientific Injection Molding process
- Understanding Scientific Molding Inputs and Outputs for:
  - 1<sup>st</sup> Stage Filling
  - 1<sup>st</sup> Stage to 2<sup>nd</sup> Stage Transfer
  - 2<sup>nd</sup> Stage Pack
  - Screw Delay
  - Screw Recovery
  - Screw Decompression
  - Cooling Time
  - Mold Opening
  - Part Ejection
  - Mold Closing
  - Clamping



- Review of applicable mathematics for the production floor
- Understanding of formulas, decimals, and negative numbers
- Proper use of a calculator to perform daily calculations
- Understanding of common metric and imperial units
- Calculating percentages, tolerances, and common equations
- Understanding number rounding, significant figures, and fractions

**Day 1 : Classroom Discussion Topics**

- Scientific Molding Review
- Practical Rheology for Scientific Molding
- Improving 1st Stage Cavity Imbalance
- Screw Recovery Optimization
- 1st Stage Check Ring Repeatability

**Day 1 : Practical Skill Development**

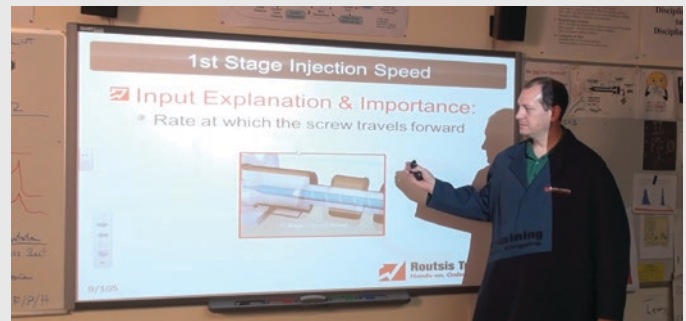
- 1<sup>st</sup> Stage Injection Speed Determination
- 1<sup>st</sup> Stage Injection Rheology Curve
- 1<sup>st</sup> Stage Injection Optimization
- 1<sup>st</sup> Stage Cavity Imbalance
- 1<sup>st</sup> Stage Check Ring Evaluation
- 2<sup>nd</sup> Stage Packing Pressure Optimization
- 2<sup>nd</sup> Stage Packing Time Optimization
- 2<sup>nd</sup> Stage Final Cushion Optimization
- 2<sup>nd</sup> Stage Clamp Force Optimization
- Scientific Process Documentation
- Comparative Rheology Study (optional)

**Day 1 : Skills & Learning Objectives**

- Understanding process parameters for screw recovery
- Screw decompression both before & after screw recovery
- Minimizing the stresses imposed on the material
- How to reduce screw flex and breakage during recovery
- Reduction of energy consumption during shot generation
- Proper uses for back pressure during screw recovery
- Melt and mold temperature measurement technique review
- Proper melt temperature matching troubleshooting techniques
- Optimization of screw recovery efficiency through rear zone temperature
- Practice setting of screw recovery to minimize material degradation
- Effective 2<sup>nd</sup> Stage packing pressure establishment techniques
- 2<sup>nd</sup> Stage packing time determination using part weight
- Proper cushion sizing techniques to compensate for variation



- Establishing a 90 to 95% 1<sup>st</sup> Stage fill based on part weight
- Practical gate seal time determination techniques
- Graphing of part weight vs. 2<sup>nd</sup> Stage packing time
- Selection of optimal 2<sup>nd</sup> Stage packing time for variation compensation
- Determination of the optimal 1<sup>st</sup> Stage Injection Speed
- Evaluation of the cavity imbalance at different speeds



**Day 2 : Classroom Discussion Topics**

- Cooling Time, Temperature & Cooling Rate
- Determining Plastic Pressure
- Mold Opening & Closing Optimization
- Part Ejection Optimization
- Mold Clamping Optimization
- Machine Process Control Systems

**Day 2 : Practical Skill Development**

- Coolant Temperature Optimization
- Cooling Time Optimization
- Rear Zone Temperature Optimization
- Screw Recovery Optimization
- Mold Opening Optimization



- Mold Closing Optimization
- Part Removal Optimization
- Rear Zone Temperature Optimization
- Scientific Process Documentation

### Day 2 : Skills & Learning Objectives

- Understanding the difference between hydraulic and plastic pressure
- Common hydraulic to plastic pressure conversion techniques
- Proper machine independent process documentation techniques
- Scientific process documentation techniques for:
  - 1<sup>st</sup> Stage Injection
  - 2<sup>nd</sup> Stage Packing
  - Part Cooling
  - Material Recovery
  - Mold Clamping
- Machine independent coolant temperature measurement techniques
- Mold temperature measurement technique review
- Proper melt temperature matching troubleshooting techniques
- Difference between mold, coolant, and controller temperatures
- Optimal mold temperature determination techniques
- Review of the steps to determine the most efficient cooling time
- Common hydraulic to plastic pressure conversion techniques
- Proper machine independent process documentation techniques
- Understanding closed loop process control systems
- Conventional hydraulic, servo pump & electric molding machines
- Effective part removal techniques including clamp & ejection

### Post-Requisite Online Training

- Processing for Profit
- Purging for Scientific Molders

### Post-Requisite Learning Objectives

- Using proper process documentation to your advantage
- Proper Housekeeping and 5S best practices
- Optimizing Scientific Molding parameters for:
  - 1<sup>st</sup> Stage Filling
  - 1<sup>st</sup> Stage to 2<sup>nd</sup> Stage Transfer
  - 2<sup>nd</sup> Stage Pack
  - Screw Delay & Decompression
  - Screw Recovery
  - Cooling Time
  - Mold Opening & Closing
  - Part Ejection
  - Clamping
- Understanding the effectiveness of different purging techniques
- Proper safety and procedures during purging operations
- Different types of purging compounds and how they operate
- Effective scientific purging analysis and comparison techniques



PRODUCT INFORMATION:

### SmartTech™ Scientific Optimization Pro: On-Site Scientific Molding Training

*2 Days of On-Site Skill Development*

product id: **crt.im3**

Please contact us for pricing and availability.