Here’s a brief overview of how our RightStart™ system works:

1. A Routsis Trainer (not a sub-contractor!) visits your plant and creates a training plan specifically designed for each employee at your workplace.

2. Based on your facility and existing equipment, we create job-specific tasks to develop and reinforce proper day-to-day work habits.

3. We show you how to implement, manage, track, and customize your training – so you can successfully launch your new training initiative.

4. Start training immediately with access to the world’s largest library of engaging, practical plastics training courses.

5. We provide ongoing support and continuous oversight to ensure you get the most out of your in-house training program.

“This training system teaches everyone about our specialized high-speed molding process. It fits perfectly with our operation, and we’re continuously improving performance.”

“With Routsis, we’ve transformed training into a key part of our business strategy. Instead of searching elsewhere for talent, we’re developing employees internally.”

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PO Box 894 | Dracut, MA 01826 (USA)
(978) 957-0700
## Fundamentals Injection Molding Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Injection Molding</td>
<td>7</td>
</tr>
<tr>
<td>Injection Molding Basics, Part 1: The Injection Molding Machine</td>
<td>8</td>
</tr>
<tr>
<td>Injection Molding Basics, Part 2: The Injection Molding Process</td>
<td>8</td>
</tr>
<tr>
<td>Injection Molding Basics, Part 3: The Injection Mold</td>
<td>9</td>
</tr>
<tr>
<td>Understanding Plastics</td>
<td>10</td>
</tr>
</tbody>
</table>

## Scientific Molding Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishing a Scientific Injection Molding Process</td>
<td>11</td>
</tr>
<tr>
<td>Process Documentation for Scientific Molders</td>
<td>12</td>
</tr>
<tr>
<td>Process Parameters for Scientific Molding, Part 2: Process</td>
<td>13</td>
</tr>
<tr>
<td>Injection Mold Setup for Scientific Molders, Part 1: Removal</td>
<td>14</td>
</tr>
<tr>
<td>Injection Mold Setup for Scientific Molders, Part 2: Installation</td>
<td>14</td>
</tr>
<tr>
<td>Material Drying Technology, Part 1: Introduction</td>
<td>15</td>
</tr>
<tr>
<td>Material Drying Technology, Part 2: Equipment</td>
<td>15</td>
</tr>
<tr>
<td>Purging for Scientific Molders, Part 1: Techniques</td>
<td>16</td>
</tr>
<tr>
<td>Purging for Scientific Molders, Part 2: Procedures</td>
<td>16</td>
</tr>
<tr>
<td>Purging for Scientific Molders, Part 3: Compounds</td>
<td>16</td>
</tr>
<tr>
<td>Purging for Scientific Molders, Part 4: Analysis + Worksheet</td>
<td>16</td>
</tr>
<tr>
<td>Automation &amp; Robotics for Scientific Molding, Part 1: Automation</td>
<td>17</td>
</tr>
<tr>
<td>Automation &amp; Robotics for Scientific Molding, Part 2: Robotics</td>
<td>17</td>
</tr>
<tr>
<td>Understanding Electric Injection Molding Machines</td>
<td>18</td>
</tr>
<tr>
<td>Processing with Electric Injection Molding Machines</td>
<td>18</td>
</tr>
<tr>
<td>Math for Scientific Molders, Part 1: Basic</td>
<td>19</td>
</tr>
<tr>
<td>Math for Scientific Molders, Part 2: Advanced</td>
<td>19</td>
</tr>
<tr>
<td>Scientific Troubleshooting, Part 1: Introduction</td>
<td>20</td>
</tr>
<tr>
<td>Scientific Troubleshooting, Part 2: Visual Defects</td>
<td>20</td>
</tr>
<tr>
<td>Scientific Troubleshooting, Part 3: Dimensional Defects</td>
<td>21</td>
</tr>
<tr>
<td>Scientific Troubleshooting, Part 4: Material &amp; Cycle Defects</td>
<td>21</td>
</tr>
<tr>
<td>Processing For Profit</td>
<td>22</td>
</tr>
</tbody>
</table>

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continued on next page...
Scientific Molding SkillSet™ Labs + Worksheets

<table>
<thead>
<tr>
<th>Course</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melt Temperature Measurement</td>
<td>24</td>
</tr>
<tr>
<td>Mold Temperature Measurement</td>
<td>24</td>
</tr>
<tr>
<td>Process Documentation</td>
<td>24</td>
</tr>
<tr>
<td>1st Stage Fill Progression</td>
<td>24</td>
</tr>
<tr>
<td>1st Stage Injection Speed</td>
<td>24</td>
</tr>
<tr>
<td>1st Stage Rheology Curve</td>
<td>24</td>
</tr>
<tr>
<td>1st Stage Cavity Imbalance</td>
<td>24</td>
</tr>
<tr>
<td>1st Stage Injection Transfer</td>
<td>24</td>
</tr>
<tr>
<td>1st Stage Injection Pressure</td>
<td>24</td>
</tr>
<tr>
<td>1st Stage Injection Time</td>
<td>24</td>
</tr>
<tr>
<td>1st Stage Check Ring Evaluation</td>
<td>24</td>
</tr>
<tr>
<td>2nd Stage Packing Pressure</td>
<td>24</td>
</tr>
<tr>
<td>2nd Stage Packing Time</td>
<td>24</td>
</tr>
<tr>
<td>2nd Stage Final Cushion</td>
<td>24</td>
</tr>
<tr>
<td>2nd Stage Clamp Force</td>
<td>24</td>
</tr>
<tr>
<td>Coolant Temperature</td>
<td>24</td>
</tr>
<tr>
<td>Cooling Time</td>
<td>25</td>
</tr>
<tr>
<td>Rear Zone Temperature</td>
<td>25</td>
</tr>
<tr>
<td>Screw Recovery Time</td>
<td>25</td>
</tr>
<tr>
<td>Mold Opening</td>
<td>25</td>
</tr>
<tr>
<td>Part Ejection</td>
<td>25</td>
</tr>
<tr>
<td>Mold Closing</td>
<td>25</td>
</tr>
<tr>
<td>Mold Protect Force</td>
<td>25</td>
</tr>
<tr>
<td>Comparative Rheology</td>
<td>25</td>
</tr>
<tr>
<td>Measuring Mold Deflection</td>
<td>25</td>
</tr>
<tr>
<td>Measuring Platen Deflection</td>
<td>25</td>
</tr>
</tbody>
</table>

Injection Molding Maintenance Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injection Molding Machine Maintenance</td>
<td>26</td>
</tr>
<tr>
<td>Injection Mold Maintenance</td>
<td>27</td>
</tr>
<tr>
<td>Injection Molding Hydraulics</td>
<td>28</td>
</tr>
<tr>
<td>Process Control Systems</td>
<td>29</td>
</tr>
</tbody>
</table>

Lean Manufacturing SkillSet™ Labs + Worksheets

<table>
<thead>
<tr>
<th>Course</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5S System, Step 1: Sorting</td>
<td>31</td>
</tr>
<tr>
<td>5S System, Step 2: Straightening</td>
<td>31</td>
</tr>
<tr>
<td>5S System, Step 3: Sweeping</td>
<td>31</td>
</tr>
<tr>
<td>5S System, Step 4: Standardizing</td>
<td>31</td>
</tr>
<tr>
<td>5S System, Step 5: Sustaining</td>
<td>31</td>
</tr>
</tbody>
</table>

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Basic Measuring Tools SkillSet™ Labs + Worksheets

<table>
<thead>
<tr>
<th>Labs + Worksheets</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using a Go / No-Go Gauge</td>
<td>32</td>
</tr>
<tr>
<td>Using Pin Gauges</td>
<td>32</td>
</tr>
<tr>
<td>Using Thickness Gauges</td>
<td>32</td>
</tr>
<tr>
<td>Using Gauge Blocks</td>
<td>32</td>
</tr>
<tr>
<td>Using a Linear Indicator</td>
<td>32</td>
</tr>
<tr>
<td>Using Slide Calipers for Outside Measurement</td>
<td>32</td>
</tr>
<tr>
<td>Using Slide Calipers for Inside Measurement</td>
<td>33</td>
</tr>
<tr>
<td>Using Slide Calipers for Depth Measurement</td>
<td>33</td>
</tr>
<tr>
<td>Field-Checking Slide Calipers</td>
<td>33</td>
</tr>
<tr>
<td>Using an Outside Micrometer</td>
<td>33</td>
</tr>
<tr>
<td>Using an Inside Micrometer</td>
<td>33</td>
</tr>
<tr>
<td>Using a Depth Micrometer</td>
<td>33</td>
</tr>
<tr>
<td>Field-Checking an Outside Micrometer</td>
<td>33</td>
</tr>
<tr>
<td>Field-Checking an Inside Micrometer</td>
<td>33</td>
</tr>
<tr>
<td>Field-Checking a Depth Micrometer</td>
<td>33</td>
</tr>
<tr>
<td>Using a Depth Gauge</td>
<td>33</td>
</tr>
<tr>
<td>Using a Height Gauge</td>
<td>33</td>
</tr>
<tr>
<td>Using a Dial Bore Gauge</td>
<td>33</td>
</tr>
<tr>
<td>Using a Hole Gauge or Telescoping Gauge</td>
<td>33</td>
</tr>
<tr>
<td>Field-Checking a Depth Gauge</td>
<td>33</td>
</tr>
<tr>
<td>Field-Checking a Height Gauge</td>
<td>33</td>
</tr>
</tbody>
</table>

Blueprint Reading Courses

<table>
<thead>
<tr>
<th>Courses</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Engineering Drawings</td>
<td>34</td>
</tr>
<tr>
<td>Multiview Drawings</td>
<td>34</td>
</tr>
<tr>
<td>Sectional Views</td>
<td>34</td>
</tr>
<tr>
<td>Dimensions and Tolerances, Part 1</td>
<td>35</td>
</tr>
<tr>
<td>Dimensions and Tolerances, Part 2</td>
<td>35</td>
</tr>
<tr>
<td>Part Feature Specifications</td>
<td>35</td>
</tr>
</tbody>
</table>

Geometric Dimensioning & Tolerancing Courses

<table>
<thead>
<tr>
<th>Courses</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>GD&amp;T Basic Principles</td>
<td>36</td>
</tr>
<tr>
<td>Interpreting GD&amp;T Symbols</td>
<td>36</td>
</tr>
<tr>
<td>Form and Orientation Tolerances</td>
<td>36</td>
</tr>
<tr>
<td>Profile, Runout and Location Tolerances</td>
<td>36</td>
</tr>
</tbody>
</table>

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### Part Design Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Development &amp; the Prototype Process</td>
<td>37</td>
</tr>
<tr>
<td>Mechanical Behavior of Polymers</td>
<td>37</td>
</tr>
<tr>
<td>Mold Filling, Gating &amp; Weld Lines</td>
<td>37</td>
</tr>
<tr>
<td>Shrinkage, Warpage, &amp; Part Ejection</td>
<td>38</td>
</tr>
<tr>
<td>Mechanical Fasteners, Press &amp; Snap Fits</td>
<td>38</td>
</tr>
<tr>
<td>Welding &amp; Adhesives Bonding Technology</td>
<td>38</td>
</tr>
</tbody>
</table>

### Mold Design & Moldmaking Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injection Mold Fundamentals</td>
<td>39</td>
</tr>
<tr>
<td>Mold Machining Methods, Part 1</td>
<td>39</td>
</tr>
<tr>
<td>Mold Machining Methods, Part 2</td>
<td>39</td>
</tr>
<tr>
<td>2-Plate, 3-Plate, and Hot Runner Molds</td>
<td>40</td>
</tr>
<tr>
<td>Mold Bases, Tool Steels &amp; Heat Treating</td>
<td>40</td>
</tr>
<tr>
<td>External and Internal Actions</td>
<td>40</td>
</tr>
<tr>
<td>Ejection, Venting and Cooling</td>
<td>40</td>
</tr>
<tr>
<td>Part Gating Methods</td>
<td>41</td>
</tr>
<tr>
<td>Runners, Filling Software &amp; the Design Process</td>
<td>41</td>
</tr>
</tbody>
</table>

### DECOUPLED MOLDING℠ Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to DECOUPLED℠ MOLDING</td>
<td>42</td>
</tr>
<tr>
<td>DECOUPLED MOLDING℠ Techniques</td>
<td>42</td>
</tr>
<tr>
<td>Reading and Interpreting Data</td>
<td>42</td>
</tr>
<tr>
<td>Systematic Troubleshooting</td>
<td>42</td>
</tr>
<tr>
<td>Intelligent Molder, Part 1: Machine Evaluation</td>
<td>43</td>
</tr>
<tr>
<td>Intelligent Molder, Part 2: Mold Evaluation</td>
<td>43</td>
</tr>
<tr>
<td>Intelligent Molder, Part 3: Process Evaluation</td>
<td>43</td>
</tr>
<tr>
<td>RJG’s eDART℠</td>
<td>44</td>
</tr>
</tbody>
</table>
This course provides participants with a general introduction to the plastics industry. Its primary focus is the day-to-day operations of a typical injection molding facility.

*Introduction to Injection Molding* was created for newcomers to the injection molding industry or anyone that would like to learn more about plastics. We recommend that new hires take this course before participating in our *Injection Molding Basics*.

- An overview of plastics and the industry
- A typical molding facility
- General plant safety
- An introduction to the molding process
- Molding machine components
- Material handling
- Injection mold terminology
- Common part defects

出轨1 Online Course (1-2 hours)†

**product id:** rt_0111_us

出轨Multiple Language Versions Available:

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<tr>
<th>product id</th>
<th>Language</th>
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</thead>
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<tr>
<td>rt_0111_uk</td>
<td>UK / International English</td>
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<tr>
<td>rt_0111_sp</td>
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<tr>
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</tr>
<tr>
<td>rt_0111_my</td>
<td>Bahasa Malaysia</td>
</tr>
</tbody>
</table>

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Our Injection Molding Basics series provides participants with a general understanding of the three major aspects of injection molding: the machine, the process, and the mold. These programs use 3D animation to demonstrate the inner workings of the machine and mold; to easily convey otherwise complex concepts.

Important safety precautions are stressed throughout these training programs.

The three Basics courses are ideal for new hires, yet also serve as an excellent refresher course for any employee involved in plastics processing — from operators and technicians to management and setup personnel.

Part 1: Machine
- Cites important safety precautions for working around injection molding machines
- Gives an introduction to the molding process
- Introduces different injection molding machine types and the modes of operation
- Discusses injection molding machine components and their functions
- Outlines procedures for start up and shut down of a molding machine

Part 2: Process
- Discusses polymers and 3 different criteria used to classify them
- Covers some of the more common procedures for material preparation
- Introduces the injection, cooling and ejection phases
- Explains the need for an accurate process log
- Defines common part defects & explains their causes

continued on next page...
Part 3: Mold

- Explains the specific functions that an injection mold must perform
- Introduces the various machining methods used to construct molds
- Discusses the three mold configurations used in the industry
- Covers common runner shapes and gate types used in injection molds
- Gives an overview of proper injection mold maintenance

3 Online Courses (3-6 hours)

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- rt_0121_sp Spanish
- rt_0121_fr French
- rt_0121_bp Brazilian Portuguese
- rt_0121_mc Mandarin Chinese
- rt_0121_my Bahasa Malaysia

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**Understanding Plastics**

This program explains how and why plastics are different and cites several different types of polymers and processing considerations.

*Understanding Plastics* emphasizes material handling, explains regrind, and covers the effects that moisture can have on molded part properties during processing.

- The definition of plastics
- Polymer classification
- Material properties affected by processing
- Proper material handling techniques
- Processing characteristics of virgin and regrind

1 Online Course (1-2 hours)

*product id:* rt_0131_us

**Multiple Language Versions Available:**

<table>
<thead>
<tr>
<th>Product ID</th>
<th>Language</th>
</tr>
</thead>
<tbody>
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<td>American English</td>
</tr>
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<td>UK / International English</td>
</tr>
<tr>
<td>rt_0131_sp</td>
<td>Spanish</td>
</tr>
<tr>
<td>rt_0131_fr</td>
<td>French</td>
</tr>
<tr>
<td>rt_0131_bp</td>
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</tr>
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<td>Bahasa Malaysia</td>
</tr>
</tbody>
</table>

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Establishing a Scientific Molding Process

This course provides participants with in-depth processing information to better prepare them for making appropriate and cost-effective decisions when establishing or improving a scientific injection molding process.

The course teaches a processing strategy that properly decouples 1\textsuperscript{st} stage fill from 2\textsuperscript{nd} stage pack — a strategy to develop processes with much higher repeatability.

The steps outlined in this course are intended to quickly establish a scientific injection molding process, reduce downtime and improve process efficiency.

- General Rules for Scientific Processing
- Scientific Process Optimization Strategies:
  - 1\textsuperscript{st} Stage Filling
  - 1\textsuperscript{st} Stage to 2\textsuperscript{nd} Stage Transfer
  - 2\textsuperscript{nd} Stage Pack
  - Screw Recovery, Screw Delay & Screw Decompression
  - Cooling Time
  - Clamping, Mold Opening & Mold Closing
  - Part Ejection

1 Online Course (1-2 hours)†

Multiple Language Versions Available:

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- rt_0201_sp Spanish
- rt_0201_fr French
- rt_0201_bp Brazilian Portuguese
- rt_0201_mc Mandarin Chinese
- rt_0201_my Bahasa Malaysia

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Our **Process Documentation for Scientific Molders** course provides participants with a better understanding of proper documentation and the procedures associated with documenting a scientific molding process.

Participants learn the differences between machine-dependent and machine-independent process parameters — as well as the importance of proper documentation for each parameter.

Students will also learn the necessary procedures associated with documenting and maintaining a robust scientific injection molding process.

- Definition of Scientific Process Documentation
- Inputs vs. Outputs
- Machine-Dependent Documentation
- Machine-Independent Process Documentation
- Documenting Barrel & Recovery
- Documenting 1st Stage Injection
- Documenting 2nd Stage Packing
- Documenting Part Cooling
- Documenting Mold Clamping
- Hybrid Machine & Process Documentation
- Documenting All Process Changes

1 Online Course (1-2 hours)†

*product id:  rt_0202_us*
Processing Parameters for Scientific Molding

This 3-part training program will provide participants with a better understanding of the parameters involved with a scientific injection molding process and the control panels of injection molding machines.

This course is beneficial to die setters, process technicians, machine operators, maintenance personnel, engineers, and anyone else using the control panel.

Part 1 - Introduction

- Scientific Molding Overview
- 5 General Rules for Scientific Molding
- Understanding the Process Controller
- Common Units for Process Parameters

Part 2 - Process

- Process Inputs versus Process Outputs
- 1st Stage Injection Inputs and Outputs
- 2nd Stage Packing Inputs and Outputs
- Cooling Inputs and Outputs
- Screw Recovery Inputs and Outputs
- Other Commonly Found Process Inputs

Part 3 - Part Removal

- Mold Open Settings
- Part Ejection Settings
- Core Pull Settings
- Mold Closing Settings

3 Online Courses (3-6 hours)†

product id: rt_0211_us

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Injection Mold Setup

This comprehensive 2-part program provides participants with a better understanding of die setting — including safety preparation, documentation, mold removal & installation, and process startup. This is an excellent course for anyone involved in die setting, including process technicians and supervisors.

Injection Mold Setup, Program 1
- Safety Concerns and Considerations for Die Setters
- Injection Mold Setup Scheduling and Preparation
- Machine Dependent and Independent Documentation
- Proper Injection Mold Preparation and Examination
- Safe and Effective Mold Removal Techniques

Injection Mold Setup, Program 2
- Safe and Effective Mold Installation Techniques
- Setting Clamp Tonnage and Mold Protect
- Optimizing Clamp and Part Ejection Settings
- Establishing Consistent Screw Recovery
- Melt Temperature Matching Techniques
- Process Startup and Scientific Molding Principles

2 Online Courses (2-4 hours)†

Product id: rt_0221_us

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Material Drying Technology

Routsis Training’s two Material Drying Technology online courses provide participants with a better understanding of how different polymers are best dried and prepared for reliable processing. These courses show participants how proper plastics material handling and drying is critical to produce a consistent product and process.

Course One reviews polymer basics, as well as both hygroscopic and non-hygroscopic polymers—to better convey the importance of properly drying water-sensitive materials, while Course Two discusses material drying systems commonly used in industry, as well as common calculations to aid in proper material drying.

Material Drying Technology, Course 1
- Polymer Basics
- Hygroscopic vs. Non-Hygroscopic Polymers
- Hydrolysis
- Purposes of Drying
- Dewpoint
- Dewpoint Measurement
- Dewpoint Sensors
- Drying Procedures

Material Drying Technology, Course 2
- Hot Air Dryers
- Compressed Air Dryers
- Desiccant Dryers
- Vacuum Driers
- Calculating Material Consumption
- Calculating Residence Time
- Calculating Dryer Capacity

2 Online Courses (1-3 hours)†

product id:  rt_0223_us

† Course titles, descriptions, and images are provided for reference purposes only. Our courses are regularly updated and their contents may change without notice. The durations listed for courses are estimates only; actual completion time may vary. All text and images are the copyrighted property of Routsis Training, Inc.
The four online training courses in Routsi's *Purging for Scientific Molders* will teach scientific injection molders about proper material purging concepts and procedures.

The first two courses cover common purging techniques and effective purging procedures – while the third course details common types of purging compounds, how they work, and the advantages and disadvantages of each type. In the final course, users are shown how to effectively compare different purging procedures and compounds – and guided through completion of the accompanying Purging Analysis Worksheet.

We’ve also developed a *Purging Cost Analyzer* “app” that runs on both PCs and Macs — as well as iOS and Android devices. This powerful, free tool complements the online training courses and allows users to quickly and easily compare various purging compounds and/or methods.

### 1: Purging Techniques
- Definition of Purging
- General Injection Molding Safety
- Injection Molding Machine Safety
- Plastic Purging Safety
- The Purpose of Purging
- Small and Large Shot Purging
- Continuous and Closed-Mold Purging
- Dry and Wet Purging
- Purging Heat Sensitive Materials
- Purging High Temperature Materials
- Hot Runner and Gate Drop Cleaning
- Nozzle and Screw Removal

### 2: Purging Procedures
- Phase 1 – Preparation
- Phase 2 – Initial Purging
- Phase 3 – Final Purging
- Phase 4 – Production

### 3: Purging Compounds
- Common types of Compounds
- Resin-Based Purging Compounds
- Mechanical Purging Compounds
- Chemical Purging Compounds

### 4: Purging Cost Analysis
- Purging Compound Cost
- Machine Downtime Cost
- Purging Labor Cost
- Final Production Resin Cost
- Scrap and Rework Costs

*4 Online Courses (3-6 hours)*†

*product id:* rt_0227_us

*† Course titles, descriptions, and images are provided for reference purposes only. Our courses are regularly updated and their contents may change without notice. The durations listed for courses are estimates only: actual completion time may vary. All text and images are the copyrighted property of Routsis Training, Inc.*
Automation & Robotics for Scientific Molding

These training programs will provide participants with a better understanding of how automation and robotics are used to streamline production within the injection molding industry.

**Automation & Robotics for Scientific Molding, Part 1**

This training program will provide participants with a better understanding of the different options and capabilities associated with automation.

- Guarding and Safety Considerations
- Types of Automation Used for Injection Molding

**Automation & Robotics for Scientific Molding, Part 2**

This training program will provide participants with a better understanding of the different options and capabilities associated with robotics.

- Controllers and Movements of Robotics
- End-of-Arm Tooling
- Sprue Pickers
- Top-Entry Robots
- Side-Entry Robots
- Articulating Robots
- Examples of Robotics

2 Online Courses (2-3 hours)†

*product id: rt_0225_us*

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Electric Injection Molding

Our Electric Injection Molding courses provide participants with a better understanding of the benefits and capabilities of modern all-electric injection molding machines. Safety concerns particular to electric molding machines are also covered.

Part 1: Understanding Electric Injection Molding Machines
The first course explains how electric injection molding machines function and outlines their benefits and typical uses.

- General Injection Molding Safety
- Electric Molding Machine Safety
- Machine Guarding
- Comparing Hydraulic and Electric Machines
- Basic Molding Machine Functions
- Efficiency, Accuracy and Repeatability
- Alternative Machine Designs
- Typical Uses for Electric Injection Molding Machines

Part 2: Processing with Electric Injection Molding Machines
The second course prepares processors for making more appropriate and cost-effective decisions — and shows how to optimize any process running on an electric machine.

- Closed-Loop Process Controls
- Hydraulic vs. Electric Molding Machine Controls
- Process Optimization Strategies:
  - 1st Stage Filling
  - 1st Stage to 2nd Stage Transfer
  - 2nd Stage Pack
  - Screw Recovery, Screw Delay & Screw Decompression
  - Cooling Time
  - Clamping, Mold Opening & Mold Closing
  - Part Ejection

2 Online Courses (2-3 hours)†

Product id: rt_0231_us

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Math for Molders

These two courses were created for all personnel within the injection molding industry who would like to expand or fine-tune their math skills.

This training program will greatly benefit any participant of RJG’s classroom-based Master Molder® Certification Series either as a primer or as follow-up training.

Part 1
- Whole Numbers, Negative Numbers and Decimals
- Using a Calculator
- Addition, Subtraction, Multiplication and Division
- Rounding Numbers and Significant Figures
- Formulas, Equations and Order of Operations

Part 2
- Metric and Imperial Units
- Length and Distance
- Area, Volume & Flow
- Weight, Mass and Force
- Conversions
- Understanding Percentages
- Calculating Plastic Pressure and Part Shrinkage
- Calculating Tolerances

2 Online Courses (3-4 hours)

product id: rt_0241_us

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Scientific Troubleshooting for Injection Molders

These four in-depth scientific molding training programs provide participants with the knowledge base required to identify and troubleshoot over twenty-five of the most common injection molded part defects. Users will also come away with a better understanding of how to best process, document and maintain a reliable scientific injection molding process.

Introduction

This scientific molding training program focuses on the 7-step process to scientific troubleshooting. Participants are also presented with information and practices on how to best process, document and maintain a reliable scientific injection molding process.

► Step 1 – Develop a Scientific Molding Process
► Step 2 – Properly Document the Process Outputs
► Step 3 – Examine the Defective Part and Rule Out Obvious Causes
► Step 4 – Compare the Current Process with the Documented Process
► Step 5 – Return the Process to the Documented Standard
► Step 6 – Verify the Part and Process
► Step 7 – Document all Changes Made

Visual Defects

Nine of the most common visual defects encountered in injection molding processing are covered within this extensive scientific molding training program. Participants will be better prepared to troubleshoot these defects as each one will be defined and their respective causes and corrections will be explained in detail. Defects include:

► Flash
► Sinks and Voids
► Short Shots
► Jetting
► Gate Blush
► Burning
► Flow Lines
► Weld and Meld Lines
► Poor Surface Finish

continued on next page...
**Dimensional Defects**

This scientific injection molding training program will provide participants with a better understanding of how to best troubleshoot five (5) of the most common dimensional defects encountered in injection molding. Each defect will be defined and their respective causes and corrections will be explained in detail. These dimensional defects include:

- Large Parts
- Small Parts
- Larger Parts at the Gate
- Smaller Parts at the Gate
- Warpage

**Material and Cycle-Related Defects**

After completing this scientific molding training program, participants will have a better understanding of how to best identify and troubleshoot many of the most common Material and Cycle-Related defects encountered in injection molding. Each defect will be defined and their respective causes and corrections will be explained in detail. The material and cycle-related defects discussed in this course include:

- Splay, Bubbles, and Blisters
- Brittleness, Cracking, and Crazing
- Delamination
- Contamination
- Poor Color Distribution
- Part Sticking and Ejector Pin Marks
- Occasional Part Hang-Up

![Image](image_url)

**4 Online Course (6-10 hours)**

*product id: rt_0251_us*

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Processing for Profit

Processing for Profit is intended to provide injection molding processors and technicians with industry-proven procedures and techniques which can be used to easily improve the efficiency and profitability of any molding application.

- Definition of Scientific Molding
- Scientific Process Optimization
- Part Removal
- General Rules for Efficient Processing
- Die Setting
- The 5S System

1 Online Course (1-2 hours)†

product id:  rt_0261_us

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The **Scientific SkillSet™ Series** is a unique learning experience that combines detailed, step-by-step online instruction with practical hands-on labs and worksheets.

Each of the twenty-six course/worksheet combinations focuses on developing important processing-related skills that translate directly to troubleshooting, optimizing and documenting any injection molding process.

This exclusive training approach allows companies to perform the same type of classroom learning found in popular seminars in the comfort of their own production environment.

Your employees will learn how to setup a repeatable process and troubleshoot effectively through Scientific Molding.

Our **Scientific SkillSet™** online courses are cross-platform and are compatible with most modern web browsers and popular handheld devices, such as tablets and smartphones. This provides exceptional flexibility, allowing technicians to train at their own pace on the production floor — without costly trainers or consultants.

In addition to the U.S. English version, we also offer our **Scientific SkillSet™ Series** in several other languages, including: Spanish, French, Portuguese, Mandarin, and Bahasa Malaysia.

Each unique training course is a blend of the following components:

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>BACKGROUND</td>
<td>Your technicians understand the goal of each Scientific SkillSet™</td>
</tr>
<tr>
<td>PURPOSE</td>
<td>Technicians learn specifically how each Scientific SkillSet™ applies to their job</td>
</tr>
<tr>
<td>EQUIPMENT</td>
<td>Items are detailed to ensure techs have the tools they need to succeed</td>
</tr>
<tr>
<td>PROCEDURE</td>
<td>Each step is demonstrated so your techs can proceed with confidence</td>
</tr>
<tr>
<td>WORKSHEET</td>
<td>Contains all the information your techs need to complete each lab</td>
</tr>
</tbody>
</table>

The **Scientific SkillSet™** labs teach a sound scientific approach to injection molding. With over 2 dozen distinct skills being taught, your technicians can quickly learn how to apply proven Scientific Molding techniques to everyday molding processes.
Your processors and technicians will receive over 18 hours of online **SkillSet™** instruction and hands-on labs to confidently develop the following abilities:

- **Melt Temperature Measurement**
  Accurately measure & document the polymer temperature

- **Mold Temperature Measurement**
  Accurately measure and document the mold and coolant temperatures

- **Process Documentation**
  Document your process for easy duplication and scientific troubleshooting

- **1st Stage Fill Progression**
  Learn how the mold actually fills and identify problem areas

- **1st Stage Injection Speed**
  Quickly find an acceptable injection rate for part quality

- **1st Stage Injection Transfer**
  Set 1st to 2nd stage transfer to accommodate for variation

- **1st Stage Injection Pressure**
  Determine a safe maximum injection pressure to help protect the mold

- **1st Stage Injection Time**
  Set maximum injection time and prevent excessive injection

- **2nd Stage Packing Pressure**
  Find the optimal packing pressure between sinks and flash

- **2nd Stage Packing Time**
  Determine gate seal time and optimize your packing time

- **2nd Stage Final Cushion**
  Prevent bottoming-out while maximizing pressure transfer

- **2nd Stage Clamp Force**
  Set clamping to protect the mold & maximize venting effectiveness

- **Coolant Temperature**
  Establish the optimal mold coolant temperature controller settings

- **Cooling Time**
  Determine an optimized cooling time while compensating for...
normal variation

► Rear Zone Temperature
Optimize rear zone temperature to conserve energy &
maximize melting capacity

► Screw Recovery Time
Protect the quality & integrity of your polymer during melting

► Mold Opening
Optimize the clamp settings while protecting part quality

► Part Ejection
Optimize part removal while maintaining overall part quality

► Mold Closing
Optimize clamp settings while protecting the mold & actions

► Mold Protect Force
Reduce the potential for mold damage when problems occur

► 1st Stage Cavity Imbalance
Determine which speed provides the best filling balance

► 1st Stage Rheology Curve
Determine the speed at which shear thinning takes place

► Comparative Rheology
Compare materials, grades, lots, additives, temperatures, etc.

► 1st Stage Check Ring
Evaluate the functionality of the check ring during injection

► Measuring Mold Deflection
Benchmarking and troubleshooting mold deflection issues

► Measuring Platen Deflection
Benchmarking and troubleshooting platen deflection issues

26 Online Courses + Worksheets
(18-24 hours)†

product id: rt_0301_us

Multiple Language Versions Available:

rt_0301_us American English
rt_0301_uk UK / International English
rt_0301_sp Spanish
rt_0301_fr French
rt_0301_bp Brazilian Portuguese
rt_0301_mc Mandarin Chinese
rt_0301_my Bahasa Malaysia

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Molding Machine Maintenance

This online course is designed to introduce the many maintenance considerations for molding machines. Participants are also shown newer technologies; such as laser leveling, ultrasonic tie bar stretch measuring, and portable machine process monitors.

- Basic machine maintenance and safety concerns
- Fluid maintenance
- Platen maintenance
- Screw and barrel maintenance
- Preventative maintenance and logging

1 Online Course (1-2 hours)†

product id:  rt_0521_us

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Injection Mold Maintenance

This program details procedures for proper mold care before, during, and after a production run - stressing important safety considerations for mold handling.

From mold storage to part removal, this course provides participants with good mold maintenance habits and aims to extend tool life and increase its productivity.

- Proper mold maintenance
- Mold storage and preparation
- Water line maintenance
- Techniques for extending tool life

1 Online Course (1-2 hours)†

Product ID: rt_0511_us

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These courses demonstrate the importance of hydraulics and the proper maintenance of hydraulic components.

Machine operators will learn ways to reduce wear on hydraulic components, while more advanced employees concentrate on hydraulic print reading and theory.

- Basic hydraulic theory
- The role of hydraulics in molding plastic parts
- The function and purpose of hydraulic components
- Recognition of hydraulic symbols
- Directional valves and flow controls
- Hydraulic pumps and motors
- Proportional valves and servo valves
- Hydraulic fluid management

2 Online Courses (2-4 hours)

*product id: rt_0531_us*
Process Control Systems

This training program details process control systems and is designed to help molders make more educated choices. Process Control Systems is a must for any facility which employs (or plans to employ) closed loop process control.

- Open loop vs. closed loop process control
- How process control reduces variation
- Closed loop controllers
- Proper use of process control

1 Online Course (1-2 hours)

product id: rt_0533_us

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5S is a critical component of Lean Manufacturing. The 5S system is used by successful manufacturing facilities worldwide. It consists of 5 simple and concise steps — Sorting, Straightening, Sweeping, Standardizing, and Sustaining — that can help your facility reduce clutter and waste and, ultimately, increase efficiency and productivity.

Our online 5S System training courses are built on Routsis Training’s exclusive SkillSet™ model. These courses combine clear online training videos and hands-on worksheets. This approach allows companies to perform the same type of classroom learning found in popular seminars in the comfort of their own production environment.

Like all our online training programs, the 5S System™ courses are cross-platform and are compatible with most modern web browsers and popular handheld devices, such as tablets and smartphones. This provides exceptional flexibility, allowing technicians to train at their own pace on the production floor.

Each unique training course is a blend of the following components:

**BACKGROUND**

Your personnel understand the goal of each Production SkillSet™

**PURPOSE**

Employees learn specifically how each Production SkillSet™ applies to their job

**EQUIPMENT**

Items are detailed to ensure participants have the tools they need to succeed

**PROCEDURE**

Each step is demonstrated so personnel can proceed with confidence

**WORKSHEET**

Contains all the information needed to complete each lab

continued on next page...
Step 1: Sorting
In the 5S System, the Sorting step’s goal is to eliminate all unnecessary items from the immediate workplace. This is done by sorting the workplace to determine what to keep, what to toss, and what to store. This helps prevent clutter from interfering with everyday production activities.

Step 2: Straightening
At the end of the Straightening step, everything in the workplace is neatly organized; resulting in a more convenient and more efficient workplace.

Step 3: Sweeping
In the Sweeping step, the best method for cleaning each selected area in the workplace is determined. A reasonable cleaning schedule should also be determined to ensure the workplace remains efficient, clean and organized.

Step 4: Standardizing
The goal of the Standardizing step is to achieve consistency. A similar appearance and layout should be applied to all workstations whenever possible. This step is often performed after a similar workplace or area within the plant has already been straightened.

Step 5: Sustaining
The purpose of the Sustaining step is maintenance. This is achieved by a review of the workplace and the existing Sorting and Straightening documentation — to ensure the workplace is efficient and up-to-date. This helps identify necessary materials or equipment that have been added to the workplace but have not yet been incorporated into the 5S documentation.

5 Online Courses + Worksheets (3-6 hours)

product id: rt_1501_us

† Course titles, descriptions, and images are provided for reference purposes only. Our courses are regularly updated and their contents may change without notice. The durations listed for courses are estimates only; actual completion time may vary. All text and images are the copyrighted property of Routsis Training, Inc.
Our **Basic Measuring Tools** training series is based on Routsis Training’s exclusive SkillSet™ training model. This unique learning experience combines detailed, step-by-step online video instruction with hands-on worksheets.

These courses teach participants correct usage and procedures for verifying the accuracy of measuring devices used at your facility.

Each of the twenty-one video/worksheet combinations focuses on a particular measuring tool. The steps outlined in each course ensure the tool is being used properly — and providing reliable measurements. Users will learn best-practices for handling and storing measuring equipment, stabilizing tools and part features for improved accuracy, and how to perform a simplified verification (also known as a “Field Check”) for each tool covered in the training series.

Each unique training course is a blend of the following components:

<table>
<thead>
<tr>
<th>BACKGROUND</th>
<th>Explains the common uses and functionality of each measuring tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>PURPOSE</td>
<td>Users learn specifically what each Basic Measuring Tools SkillSet™ will cover</td>
</tr>
<tr>
<td>EQUIPMENT</td>
<td>Ensures participants know which tools and equipment they need to succeed</td>
</tr>
<tr>
<td>PROCEDURE</td>
<td>Each step is demonstrated so your techs can proceed with confidence</td>
</tr>
<tr>
<td>WORKSHEET</td>
<td>Contains all information and instructions required to complete each lab</td>
</tr>
</tbody>
</table>

This series is ideal for operators, inspectors, technicians, engineers, machinists, quality and maintenance personnel, research and development, metrology, field support, tooling — or anyone that works with measuring tools in any industry.

These courses discuss common gauges, indicators, calipers and micrometers. Both analog and digital displays are covered — as well as both Imperial and Metric units, making these courses relevant to a wide range of applications and manufacturing facilities around the world.

- **Using a Go / No-Go Gauge**
  Determine whether a part is acceptable or not; using a go / no-go gauge

- **Using Pin Gauges**
  Determine if a part feature is within specification by taking pin gauge measurements

- **Using Thickness Gauges**
  Determine if a part feature is within specification by taking thickness gauge measurements

- **Using a Linear Indicator**
  Determine if a part feature is within specification; based on a linear indicator measurement

- **Using Slide Calipers for Outside Measurement**
  Determine if a part feature is within specification; based on an outside measurement taken with slide calipers

- **Using Gauge Blocks**
  Create three specific heights using multiple gauge blocks — and then verify these heights through measurement

- **Using a Go / No-Go Gauge**
  Using Pin Gauges
  Using Thickness Gauges

continued on next page...
Basic Measuring Tools

► Using Slide Calipers for Inside Measurement
Determine if a part feature is within specification; based on an inside measurement using slide calipers

► Using Slide Calipers for Depth Measurement
Determine if a part feature is within specification; based on a depth measurement using slide calipers

► Field-Checking Slide Calipers
Determine if a slide caliper is functioning properly by performing a field check

► Using an Outside Micrometer
Determine if a part feature is within specification; based on an outside micrometer measurement.

► Using an Inside Micrometer
Determine if a part feature is within specification; based on an inside micrometer measurement

► Using a Depth Micrometer
Determine if a part feature is within specification; based on a depth micrometer measurement

► Field-Checking an Outside Micrometer
Determine if an outside micrometer is functioning properly by performing a field check

► Field-Checking an Inside Micrometer
Determine if an inside micrometer is functioning properly by performing a field check

► Field-Checking a Depth Micrometer
Determine if a depth micrometer is functioning properly by performing a field check

► Using a Depth Gauge
Determine if a part feature is within specification; based on a depth gauge measurement

► Using a Height Gauge
Determine if a part feature is within specification; based on a height gauge measurement

► Using a Dial Bore Gauge
Determine if a part feature is within specification; based on a dial bore gauge measurement

► Using a Hole Gauge or Telescoping Gauge
Determine if a part feature is within specification; based on a measurement taken with a hole gauge or telescoping gauge

► Field-Checking a Depth Gauge
Determine if a depth gauge is functioning properly by performing a field check

► Field-Checking a Height Gauge
Determine if a height gauge is functioning properly by performing a field check

21 Online Courses + Worksheets (15-21 hours)

Product id: rt_4001_us
Blueprint Reading

The six programs in our online Blueprint Reading training course develop workers’ abilities to accurately locate and interpret dimensions on engineering drawings. These training programs are based on ANSI standards and incorporate input from a broad industrial cross-section.

The primary audience is production and inspection personnel, supervisors, group leaders, set-up personnel, and anyone who wishes to read engineering drawings.

Course 1: Introduction to Engineering Drawings
- Explains the purpose of an engineering drawing
- Distinguish between a detail drawing and an assembly drawing
- Interpret the drawing scale
- Explains the purpose of dimensions and tolerances

Course 2: Multiview Drawings
- The six principal views of a third-angle projection
- Identify the ISO symbols for third-angle and first-angle projections
- Auxiliary views, partial views, and enlarged views
- Determine which line takes precedence over another

Course 3: Sectional Views
- Determine which portion of the part is shown in section
- Explain the purpose of section lines and identify the ways in which they are used
- Identify and interpret the common drafting conventions applied to sectional views

continued on next page...
Course 4: Dimensions and Tolerances, Part 1
► Identify the size and/or location for a given part feature
► Correctly calculate the tolerance specified for a given part feature

Course 5: Dimensions and Tolerances, Part 2
► Locate and interpret dimensions specified by chain, baseline and direct dimensioning methods
► Identify a datum feature and explain its purpose
► Explain how maximum material condition (MMC) and least material condition (LMC) apply to internal and external features
► Calculate allowance
► Identify a surface finish specification

Course 6: Part Feature Specifications
► Identifies twelve of the most common part features on a drawing
► How to correctly interpret part specifications

6 Online Courses (6-10 hours)†

product id: rt_1011_us
Geometric Dimensioning & Tolerancing

This four-course online training series builds the ability to read and interpret GD&T symbols.

Understanding the international engineering language of Geometric Dimensioning & Tolerancing is essential for communicating in the global marketplace.

Course 1: Basic Principles
- Definition and benefits of GD&T
- Basic Terminologies
- Maximum and Least material condition
- Clearance, interference and transition fits

Course 2: Interpreting GD&T Symbols
- Diameter symbol
- Coordinate vs. position system tolerance zones
- Effect of material condition on size of geometric tolerance

Course 3: Form and Orientation Tolerances
- Flatness, straightness, circularity, and cylindricity
- Orientation tolerances; perpendicularity, angularity and parallelism
- Application of maximum material condition principle and inspection procedures

Course 4: Profile, Runout and Location Tolerances
- Profile tolerances
- Runout tolerances; position, concentricity, and symmetry

4 Online Courses (4-8 hours)†

product id: rt_1021_us

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Plastic Part Design provides part designers with an understanding of the plastic part design process. This extensive, interactive online training program also addresses many of the factors and concerns associated with part design.

Dr. Robert Malloy, a respected author and professor at the University of Massachusetts, Lowell, developed these comprehensive courses.

Course 1: Product Development & The Prototype Process
- The development & prototype process
- Product development steps
- Concurrent engineering
- Computer simulations for design
- Rapid prototyping and tooling processes

Course 2: Mechanical Behavior of Polymers
- The mechanical behavior of polymers
- Stress/strain curves
- Visco-elastic behavior of polymers
- Creep and stress relaxation
- Fatigue and cyclic stress

Course 3: Mold Filling, Gating & Weld Lines
- Gating & weld line considerations
- Mold filling processes
- Gate types, location, and importance
- Weld line occurrence and strength determination

continued on next page...
Course 4: Shrinkage, Warpage, & Part Ejection
- How packing affects shrinkage and warpage
- The effects of part geometry
- Amorphous vs. semi-crystalline behavior
- Ejection systems for simple and complex geometry

Course 5: Mechanical Fasteners, Press & Snap Fits
- Assembly techniques
- Snap fit design and considerations
- Design for assembly and disassembly
- Boss and screw design
- Press fit design and strength equations

Course 6: Welding & Adhesives Bonding Technology
- Various part welding processes
- Joint design for injection molded parts
- Adhesive bonding applications & techniques
- Wetting, surface attraction and curing of adhesives

6 Online Courses (6-12 hours)†

product id:  rt_1331_us

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This comprehensive 9-part online training program was created with help from many of the world’s leading tool manufacturers and suppliers and is intended for tool designers, mold makers, engineers, part designers, and anyone involved in the tool procurement process.

The Mold Design and Moldmaking series familiarizes participants with the different types of injection molds, contemporary machining methods, and many of the available mold components. This course also provides the participant with a tool design methodology and a sample mold specification guide for reference.

Injection Mold Fundamentals
- The four basic functions of an injection mold
- Part design considerations
- Material considerations
- Molding machine considerations
- Initial mold design

Mold Machining Methods, Part 1
- Conventional and CNC milling
- Conventional and CNC lathe
- Conventional and CNC surface grinding
- The advantages and disadvantages to each machining method
- Finishes and stresses with each process

Mold Machining Methods, Part 2
- Conventional and CNC die sinking EDM
- CNC wire EDM
- Polishing
- Inspection equipment
- Seal-offs

continued on next page...
2-Plate, 3-Plate, and Hot Runner Molds
- Explains the three basic mold designs and their construction
- Advantage and disadvantage to each design
- Common uses for each design
- Explains different hot runner systems
- Parting line locks
- Specialty molds

Mold Bases, Tool Steels & Heat Treating
- Tooling materials and their properties
- Various heat treating methods
- Introduces alternative materials, such as Beryllium-copper
- Features DME standardized mold bases

External and Internal Actions
- Slides, core pins, & lifters
- Unscrewing & expandable cores
- Inserts
- Dissolvable cores
- Preload and seal-offs

Part Ejection, Venting and Cooling
- Ejector pins, sleeves, blades and lifters
- Stripper plates and pneumatic ejection
- Water lines, bubblers, baffles and conductive cooling rods
- Multi-stage ejection and ejection return
- Covers different forms of part venting

continued on next page...
Gating Methods
- Commonly used gates and their characteristics
- Introduction to hot runner gate design
- Introduction to cold runner gate design
- Explains manual and automatic gate removal
- Discusses gate location determination

Runners, Filling Software & The Mold Design Process
- Parting line determination and considerations
- Core and cavity block configuration
- Cooling line and ejection layout
- Additional mold components
- Mold filling analysis capabilities

9 Online Courses (9-16 hours)†

product id: rt_1311_us
RJG’s Decoupled Molding℠

These online courses convey many of the concepts and theories covered within the RJG Decoupled Molding℠ training seminars. This four-part training program starts with the major components of the molding process, and progresses to systematic troubleshooting.

Part 1 - Introduction to Decoupled Molding℠
- Discusses polymerization, crystallinity, additives, regrind and degradation
- Lists necessary components of a proper part design
- Describes the injection molding process in depth; from filling to cooling
- Covers molding machine components and their functions in depth

Part 2 - Decoupled Molding℠ Techniques
- Compares traditional and Decoupled Molding℠
- Defines the three Decoupled Molding℠ techniques
- Covers transducers and proper transducer placement
- Introduces signal conditioners and display devices

Part 3 - Reading and Interpreting Data
- Provides participants with an understanding of graphs and scaling
- Explains how to identify different types of graphical curves
- Introduces the various integrals used in Decoupled Molding℠
- Compares ideal and inconsistent pressure curves

Part 4 - Systematic Troubleshooting
- Discusses the importance of proper process documentation
- Explains the appearance and symptoms of defects
- Introduces logical steps involved in troubleshooting defects
- Describes common processing defects, their causes and corrective actions

4 Online Courses (4-6 hours)†

product id:  rt_0811_us

† Course titles, descriptions, and images are provided for reference purposes only. Our courses are regularly updated and their contents may change without notice. The durations listed for courses are estimates only: actual completion time may vary. All text and images are the copyrighted property of Routsis Training, Inc.
Intelligent Molder

These courses were produced for technicians and process engineers that want to thoroughly evaluate both the capability and repeatability of a given injection molding machine, injection mold, or injection molding process.

Each course references three in-depth tests and will greatly benefit any participant of RJG’s classroom-based, Master Molder℠ Certification Series – either as a primer or as follow-up training.

Part 1 - Machine Evaluation
- Dynamic Check Ring Repeatability Test
- Load Sensitivity Test
- Platen Deflection Test

Part 2 - Mold Evaluation
- Dynamic Cavity Imbalance Test
- Mold Deflection Test
- Tonnage Calculation Worksheet

Part 3 - Process Evaluation
- In-Mold Rheology Test
- Gate Seal Worksheet
- DECOUPLED II℠ Process Sheet

3 Online Course (3-6 hours)†

product id: rt_0821_us

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RJG’s eDART™

This course was created for production personnel that monitor and optimize injection molding processes equipped with RJG’s eDART™ process controllers. This course will greatly benefit setup personnel, process engineers, machine operators, and managers that use, or plan on using, an eDART™ system.

Participants will be better prepared to establish the following:

- Improved processing methods
- Increased operation efficiency
- Machine and process analysis
- Automated quality control
- Improved process stability

1 Online Course (1-2 hours)†

product id: rt_0831_us

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