Lesson 1: Gravity and Vacuum Filling

Topics
Gravity Filling; Vacuum Pumps; Vane Pump Construction; Piston Pump Construction; Vacuum Pump Installation; Vacuum Filling; Gravity/Vacuum Filling; Balanced Vacuum Filling; Submerged Vacuum Filling; Fill Height Control; Container Control

Objectives
• List the main advantage and disadvantages of gravity filling and vacuum filling methods.
• Tell what kinds of vacuum pumps are commonly used in filling applications.
• Describe the construction and operation of vane and piston pumps.
• Compare and contrast vacuum filling, gravity/vacuum filling, balanced vacuum filling, and submerged vacuum filling.
• Explain various methods of fill height and container control.

Lesson 2: Bottle Filling and Capping

Topics
Bottle Filling Considerations; Volumetric Filling; Piston-Type Filling Machines; Piston-Type Volumetric Filling Machines; Auger Feed Pumps; Volumetric-Displacement Machines; Constant-Level Filling Machines; Other Constant-Level Fillers; Counterpressure Filling; Capping and Sealing; Screw Cappers; Bottle Filling Machine Maintenance

Objectives
• List some of the factors considered when selecting a bottle filling machine.
• Explain the operation of, piston-type, auger, volumetric-displacement, and constant-level filling machines.
• Describe the various kinds of bottle capping and sealing.
• List the major maintenance requirements of liquid filling machines.

Lesson 3: Pressure Liquid Filling

Topics
Pressure Filling Principles; Pressure Filling Techniques; General Construction; Indexing Pressure Fillers; Indexing Container Filling; Machine Control; Indexing Container Control; Continuous Motion Pressure Fillers; Rotary Pressure Fillers; Continuous Container Control; Continuous Container Filling; Filling Nozzle Construction; Direct Pressure Filling Machines; Filling Control

Objectives
• Name the most important advantage of using positive displacement pumps on pressure filling machines.
• Name the two classifications of pressure fillers.
• List possible causes of filling inaccuracies.
• Explain the importance of proper fluid velocity in filling machine operation.

Lesson 4: Aerosol Fillers

Topics
Aerosol Filling; Aerosol Containers; Metal Container Construction; Aerosol Valves; Aerosol Propellants; Container Filling; Cold Filling; Pressure Filling; Individual Station Operation; Safety Testing; Drying; Capping; Additional Accessory Equipment

Objectives
• Explain the concept of aerosol filling.
• Describe metal container and aerosol valve construction.
• Name and describe the two methods of aerosol container filling.
• Explain the operation of the individual stations in a filling line.
• Describe the process by which aerosol containers are safety tested.

Lesson 5: Bag Forming and Filling

Topics
Machine Classification; Bag Materials; Bag Construction; Classifying Bags; Bag Forming; Additional Bag Forming Operations; Other Bag Forming Machines; Film Extrusion; Bag Filling Machines; Filling Machine Modifications; Bag Machinery Maintenance

Objectives
• List commonly used bag materials and their typical applications.
• Explain the various bag constructions and related terminology.
• Describe the film extrusion method of bag forming.
• Explain the operation of bag filling machines.
• List the major maintenance requirements of bagging machinery.

Lesson 6: Pouch Filling

Topics
Pouch Filling Machine Classification; Pouch Materials and Control; Vertical Filling Machines; Vertical Pouch Filling; Vertical Pouch Filling Modifications; Horizontal Pouch Filling; Continuous Motion Horizontal Fillers

Objectives
• Tell how pouch filling machines are classified.
• Name the three types of vertical seals made on vertical form, fill, and seal machines, and tell when each is used.
• Explain the vertical filling machine operating sequence.
• Name the two methods of classifying pouch filling machines that handle the film horizontally, and give advantages of each.
Lesson 7: Volumetric Filling Machines

Topics
Types of Volumetric Filling Machines; Balance Point Measuring; Measuring by Volume; High Speed Measuring by Volume; Intermittent Motion Fillers; High Speed Measuring by Volume; Continuous Vacuum Draw Filling; Measuring by Weight; Liquid Volumetric Filling; Volumetric Piston Filling Machines; Volumetric Filling Machine Maintenance

Objectives
- Give examples of products that can be handled by volumetric fillers.
- Explain how volumetric filling machines are identified.
- Describe the operation of volumetric filling machines.
- Describe the various methods of measuring products packaged on volumetric filling machines.
- Explain how liquid volumetric filling is controlled.

Lesson 8: Filling by Count

Topics
Why Count Filling is Used; Machine Selection Factors; Filling by Count Machines; Flat Plate and Disc Sorters; Column Measuring; Modified Column Counting Machines; Electronic Counting; Strip Packaging Machines; Blister Strip Packaging Machines; Cottoning Devices

Objectives
- Give examples of products that are commonly packaged by count.
- Describe three methods of counting product in a fill by count machine.
- Define the term strip packaging, name its two classifications.
- Give an example of a product packaged by each of the two strip packaging methods.

Lesson 9: Positive Displacement Filling

Topics
Principles of Filling; Controlling the Fill; Filling Machines; Manual Fillers; Automatic Filling Machines; Timing Control; Continuous Motion Filling Machines; Rotary Filling Methods; Machine Maintenance

Objectives
- Trace the positive displacement filling cycle.
- Name the kinds of pumps used to fill containers on positive displacement filling machines.
- Describe the controls associated with positive displacement filling systems.
- List important points in the maintenance of positive displacement filling machines.

Lesson 10: Blister Packing

Topics
Blister Packaging; Blister Films; Blister Cards; Blister Card Board Construction; Blister Card Problems; Reducing Blister Failures; Preliminary Test Procedures; Conducting the Tests; Seal Examination and Evaluation; Product Compatibility; Blister Forming Machines; Blister Packaging and Sealing Machines

Objectives
- Define the term thermoforming.
- Describe the film and card materials commonly used in blister packing.
- Give several examples of problems that can cause blister failures.
- Describe the tests and evaluations performed on blister package seals.
- Tell what kind of film is most often used with inline blister forming machines.