Thick Sheet Thermoforming

Thick sheet or heavy gauge thermoforming is a process that transforms a flat sheet of plastic into a functional form used to create a wide variety of consumer and industrial plastic parts. While simple in concept, thermoforming is a complex process requiring knowledgeable and skilled personnel at all levels in the plant.

These five lessons teach the fundamentals of the thermoforming process, how to quickly solve problems and how best to develop advanced troubleshooting skills. Many of the conditions that cause part defects are explained. Personnel taking this course will become knowledgeable of the process, the characteristics of thermoformed parts and the most common causes of part defects.

- This in-depth course offers complete training on all aspects of day-to-day thermoforming production and will:
- Show and describe each step of the thermoforming process using actual in-plant footage and high definition 3D animation.
- Describe the best way to effectively heat the plastic based on material properties
- Explain the effects on the formed parts of each step in the process: heating, forming and trimming.
- Teach how to optimize control settings and thermoforming for maximum efficiency and profit.

Recommended For: Machine Operators, Setup Personnel, Process Technicians, Maintenance Technicians, Process Engineers, Project Engineers

1. **Lesson**
   **Introduction: Plastics and the Thermoforming Process**
   In this section of the course personnel will be introduced to basic thermoforming methods, types of thermoforming machines, the structure and properties of plastic including the characteristics of semi-crystalline and amorphous plastic and effects of temperature on the plastic sheet. Plastics are materials that have their own unique properties. Well-regulated control of plastic temperatures will minimize plastic degradation, shrinkage and contribute to part thickness uniformity and improve over all part quality.

2. **Lesson**
   **Properties of Extruded Sheet**
   This section explains the importance of extruded sheet quality and its effects on part properties and an overview of the thermoforming process. Emphasis is on looking inside the sheet forming process to see what happens to the plastic, the internal structure of the extruded sheet and how it affects the thermoformed parts, sheet quality control of sheet thickness, MFI, internal stress, and warp.

3. **Lesson**
   **Effective Heating of the Plastic Sheet**
   In the thermoforming process, the plastic is heated twice—once in the extruder and once in the thermoforming machine. This lesson covers the three main heating methods used in the thermoforming machine—conduction, convection and infrared. Control of heating in the thermoformer is key to good part quality. This section explains how plastic absorbs heat and how that affects the thermoforming process. This lesson expands on the infrared heating of the plastic sheet including emissivity, view factor, wavelength and absorption.
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