

PU 105: Introduction to the Polyurethane Process Equipment

Course Description:

This course introduces participants to the process equipment used in polyurethane manufacturing. The course covers the full spectrum of metering machine types — from low pressure to high pressure systems — along with mixing head designs, electrical controls, and plant layout configurations. Participants will gain practical knowledge of machine components, operating parameters, shot cycle sequencing, and a variety of production plant designs including rotary, conveyor, slabstock, and pultrusion systems.

Introduction

Metering Machines

- Overview of polyurethane processing machines
- Basic low pressure machine type and capability
- Low pressure and high pressure machine comparisons
- Basic high pressure machine type and capability
 - Pump and cylinder units
- Basic machine operation via flow sheets (chemical & hydraulic)
- Basic components, parameters, and spare parts
 - Tanks, filters, flow meters, agitators, heat exchangers, hydraulics, etc.
- Types and function of metering pumps and cylinders
- Machine output (flow rate) rate adjustment
- Shaft sealing and magnetic couplings
- Impacts of formulation changes

Metering Machine Mixing Heads

- Introduction to the variety of mixing heads
- Motionless mixers
- Design and function of low-pressure mixing heads
- Design and function of high-pressure impingement heads
- Specialty impingement mixing heads
- Nozzle flow rates and adjusting the mixing pressure
- Spray foam mixing heads

Electrical Control

- Basic Metering Controls
- Process information and operator interface
- Open and closed loop control
- Chronological sequence of a shot cycles
 - Low pressure

- High pressure
- Key Process Parameters

Plant Design

- Injection, casting, and spray applications
- Single and multiple station applications
- Rotary table systems
- Gasketing plant design
- Racetrack, carousel, and conveyor systems
- Continuous and slabstock plant design
- Pultrusion plant design