

PU 106: Introduction to Composites

Course Description:

This course provides a broad introduction to composite materials and their role in modern manufacturing. Participants will explore the classification and history of composites, resin technologies ranging from thermosets to thermoplastics, and the properties of various fiber and filler systems. The course also covers the manufacturing equipment used in composite production and addresses emerging topics in recycling and the circular economy.

Introduction to Composites

- What is a Composite and Where Do Composites Fit?
- History of Composites
- General Classification of Composites (Continuous vs. Discontinuous Fibers)
- General Composite Applications
- Advantages / Disadvantages of Composites
- Strategy When Using Composites
- Main markets

Resin Technology

- Introduction to Resins
- Thermoset vs. Thermoplastic
- Overview of Thermoplastics
- Overview of Thermosets
- Detailed Thermosets Information
 - Polyesters
 - Vinyl Esters
 - Epoxies (base + hardener discussion)
 - Polyurethanes
 - Phenolics
 - Others
- Resin Selection Guidance
- Example Formulations

Filler/Fiber Technology

- Introduction to Fillers/Fibers
- Continuous Fibers vs. Discontinuous Fibers
- Fiber Type Comparison
- Textile Forms and Architecture
- Fiber/Matrix Interface
- Fiber Sizing

Manufacturing Equipment

- Dosing Units

- Mixing Heads
- Presses, Performers, and Molds

Recycling and Circular Economy

- EU Regulation
- Recycling Carbon Fiber