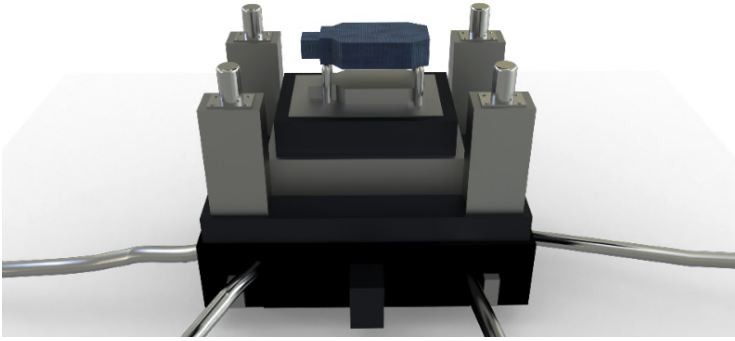


COMPOSITE MANUFACTURING

eLearning courses designed to increase productivity and profits



Learning Made Simple, Visual, and Interactive

The THORS Composite Manufacturing course provides learners with an understanding of the different manufacturing processes used to manufacture thermoset and thermoplastic composites. The course also explains the testing methods used post manufacturing, and the common defects along with their troubleshooting techniques.

Credit Hours **2.0**

Learning Objectives

- Describe the different manufacturing processes used to manufacture composite materials.
- Explain the steps involved in manufacturing of thermoset and thermoplastic composite materials.
- Compare and contrast different composite manufacturing processes.
- Identify the different testing methods used for manufactured composite materials.
- Analyze the defects in the manufactured composite materials, their preventive, and corrective measures.

Table of Contents

I. Thermoset Composite Manufacturing

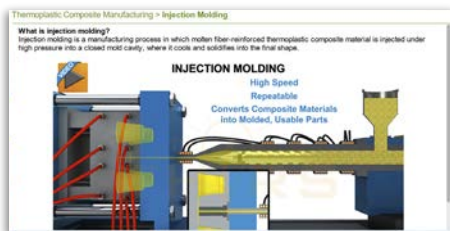
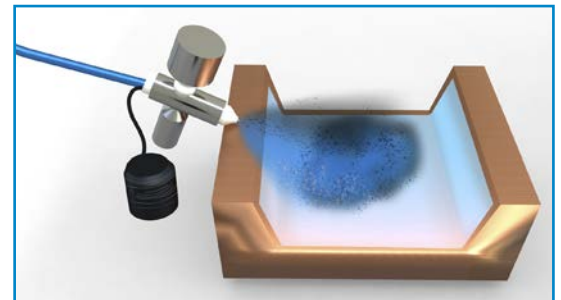
- Hand Lay-Up
- Spray Lay-Up
- Resin Transfer Molding (RTM)
- Filament Winding
- Pultrusion
- Autoclave Molding
- Tape Laying and Fiber Laying

II. Thermoplastic Composite Manufacturing

- Laminate Thermoforming
- Injection Molding
- Compression Molding
- Fused Filament Fabrication

III. Testing and Defects

- Classification of Testing
 - Destructive Testing
 - Nondestructive Testing
- Common Defects and Troubleshooting
 - Delamination
 - Voids
 - Warping
 - Fiber Misalignment
 - Resin Starvation
 - Porosity
 - Disbond



Testing and Defects > Classification of Testing > Nondestructive Testing		
What is nondestructive testing? Nondestructive testing is the inspection and evaluation of a composite sample without causing damage ensuring that it remains functional after testing. Common nondestructive testing methods include visual inspection, ultrasonic testing, radiography, thermography, and tap or coin test.		
Testing Method	Application	Defects Identified
Visual Inspection	To quickly identify obvious surface defects during manufacturing, curing, and maintenance	Inspecting the surface of the composite material with the naked eye for cracks, voids, blisters, or fiber misalignment
Ultrasonic Testing	When internal defects need to be inspected	Uses high frequency sound waves to detect internal defects, crack formation, and fiber breakage.
Radiography	When detailed information about defects in thick or complex parts is required	Uses X-rays to identify internal flaws, cracks, or inclusions within the laminate
Thermography	When large areas need to be inspected quickly or when access is available from only one side of the part	Detects hidden defects based on temperature differences
Tap or Coin Test	When field inspection or maintenance checks are carried out	Detects delaminated or hollow areas based on sound differences

