

FlexSim Essentials: Simulation Modeling & 3D Modeling Fundamentals

Target Audience

This course is designed for professionals and students who want to build a strong foundation in Discrete Event Simulation (DES) using FlexSim. It is ideal for Industrial Engineers, Manufacturing Engineers, Production Engineers, Process Engineers, Mechanical Engineers, Warehouse and Logistics Professionals, Operations Managers, Business Analysts, Lean Six Sigma Professionals, Healthcare Operations Professionals, engineering students, and simulation beginners. Participants will gain the knowledge and practical skills required to design, develop, visualize, validate, and analyze interactive 3D simulation models for manufacturing, warehouse, healthcare, and service operations.

Course Outcomes

After completing this course, participants will be able to:

- Understand the core concepts and terminology of Discrete Event Simulation (DES).
 - Navigate and efficiently utilize the FlexSim modeling environment.
 - Create interactive 3D simulation models for various business scenarios.
 - Configure simulation objects and define material flow logic.
 - Build production, warehouse, healthcare, and service operation simulation models.
 - Apply routing strategies, resource allocation, and material handling concepts.
 - Develop basic Process Flow workflows for workflow automation.
 - Monitor simulation performance using statistics, dashboards, charts, and reports.
 - Validate, verify, and debug simulation models using industry best practices.
 - Design and present complete beginner-level simulation projects using FlexSim.
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Course Objectives

Upon completion of this course, participants will be able to:

- Introduce the principles of Discrete Event Simulation and simulation modeling methodologies.
- Develop practical skills in building interactive 3D simulation models using FlexSim.

- Provide structured, hands-on experience with simulation object configuration and model development.
 - Demonstrate material flow modeling, routing strategies, and resource management techniques.
 - Build foundational knowledge of Process Flow and workflow automation.
 - Develop competency in simulation visualization, reporting, and performance analysis.
 - Apply model verification, validation, debugging, and documentation best practices.
 - Reinforce learning through guided labs, mini projects, and a comprehensive capstone project aligned with real-world industrial applications.
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Course Outline

The course comprises **32-hours** of theory and labs and is divided into **10** different chapters. Each chapter will be followed by hands-on lab exercises to reinforce learning and gauge understanding of the topics covered.

Table of Contents

Chapter 1: Introduction to Simulation & FlexSim

- Introduction to Simulation
- Types of Simulation
- Discrete Event Simulation (DES)
- Benefits of Simulation Modeling
- Real-World Applications of Simulation
- Introduction to FlexSim
- Understanding the FlexSim Architecture
- Exploring the FlexSim Interface
- Object Library Overview
- Working in the 3D Workspace
- Creating, Saving, and Managing Models
- Best Practices for Setting Up Simulation Projects
- **Hands-on Lab**

- Explore the FlexSim Interface
- Create and Save Your First Simulation Model

Chapter 2: Working with the FlexSim Modeling Environment

- Understanding Simulation Objects
- Object Categories
- Configuring Object Properties
- Connecting Simulation Objects
- Model Hierarchy
- Global Tools
- Camera Navigation
- View Controls
- Simulation Controls
- Running, Pausing, Resetting, and Stopping Models
- Organizing Simulation Models
- Workspace Navigation Best Practices
- **Hands-on Lab**
 - Build and Organize a Basic Simulation Workspace

Chapter 3: Building Your First Simulation Model

- Source Objects
- Queue Objects
- Processor Objects
- Sink Objects
- Connecting Objects
- Item Creation
- Processing Logic
- Queue Management
- Monitoring Object Statistics

- Executing Simulation Models
 - Understanding Basic Model Flow
 - Simulation Execution and Analysis
 - **Mini Project**
 - Develop a Basic Production Line Simulation
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Chapter 4: Material Flow & Routing Fundamentals

- Flow Items
 - Item Properties
 - Labels
 - Routing Methods
 - Push Logic
 - Pull Logic
 - Buffer Management
 - Processing Sequences
 - Product Movement
 - Basic Decision Logic
 - Material Flow Optimization Fundamentals
 - Routing Strategy Best Practices
 - **Mini Project**
 - Develop a Multi-Stage Production Workflow
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Chapter 5: Resource & Material Handling Fundamentals

- Operators
- Transporters
- Task Sequences
- Resource Assignment
- Resource Utilization
- Material Handling Concepts

- Conveyor Objects
 - Transfer Points
 - Merge Operations
 - Split Operations
 - Conveyor Control Basics
 - Resource Coordination Techniques
 - **Mini Project**
 - Develop a Conveyor-Assisted Production Model
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Chapter 6: Introduction to Process Flow

- Understanding Process Flow
 - Process Flow Interface
 - Activities
 - Tokens
 - Resource Requests
 - Waiting Logic
 - Decision Activities
 - Linking Process Flow with 3D Models
 - Basic Workflow Automation
 - Process Flow Design Best Practices
 - Introduction to Event-Based Workflow Logic
 - **Mini Project**
 - Create a Warehouse Order Processing Workflow
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Chapter 7: Simulation Visualization & Performance Monitoring

- Simulation Statistics
- Object Statistics
- Throughput
- Staytime

- Resource Utilization
 - Charts
 - Histograms
 - Dashboard Basics
 - Data Collection
 - Basic Performance Interpretation
 - Performance Reporting Fundamentals
 - Simulation Result Visualization Techniques
 - **Hands-on Lab**
 - Generate Reports and Visualize Simulation Performance
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Chapter 8: Industry Simulation Mini Projects

- Manufacturing Simulation
- Assembly Line Modeling
- Machine Processing
- Production Flow
- Warehouse & Logistics Simulation
- Receiving Operations
- Storage
- Picking
- Packing
- Shipping
- Healthcare Simulation
- Patient Registration
- Waiting Area
- Consultation Workflow
- Patient Flow
- Service Operations Simulation
- Customer Queue Management

- Service Counter Operations
- Resource Allocation
- Industry Modeling Best Practices
- **Mini Project**
 - Manufacturing Production Cell
 - Warehouse Material Flow
 - Healthcare Patient Flow
 - Customer Service Center

Chapter 9: Model Testing, Validation & Debugging

- Model Verification
- Model Validation
- Common Modeling Errors
- Debugging Techniques
- Error Messages
- Comparing Simulation Runs
- Improving Model Accuracy
- Model Documentation
- Simulation Modeling Best Practices
- Validation Workflow
- Debugging and Troubleshooting Techniques
- **Hands-on Lab**
 - Validate and Debug an Existing Simulation Model

Chapter 10: Capstone Simulation Project

- Understanding Business Requirements
- Designing the Simulation Model
- Selecting Simulation Objects
- Developing the Model

- Configuring Resources
- Executing Simulation Runs
- Reviewing Simulation Results
- Preparing Project Documentation
- Presenting the Simulation Model
- Project Review and Performance Evaluation
- Simulation Modeling Best Practices Review
- Final Project Presentation
- **Capstone Project Options**
 - Manufacturing Production Line
 - Warehouse Distribution Center
 - Healthcare Patient Flow
 - Customer Service Operations