MEPF Modeling with BIM Management, Coordination & Collaboration

Course Description

This course introduces participants to Building Information Modelling (BIM) management principles and equips them with hands-on skills in Autodesk Revit MEPF (Mechanical, Electrical, Plumbing & Fire Protection). The program begins with the fundamentals of BIM, Industry 4.0, ISO 19650 standards, and information delivery frameworks, followed by practical training in creating, managing, and coordinating MEPF systems within Revit. Participants will learn how to design HVAC, electrical, plumbing, and fire protection systems, while applying BIM standards to streamline documentation and collaboration in real-world projects.

Audience Profile

- MEP engineers and consultants (mechanical, electrical, plumbing, and fire protection)
- BIM coordinators, BIM managers, and digital engineers
- AEC professionals transitioning from CAD-based MEP to BIM workflows
- Students and graduates in building services or related disciplines

Prerequisites

- Basic knowledge of mechanical, electrical, and plumbing systems in building design
- Familiarity with CAD/design tools is beneficial but not mandatory
- General computer literacy

Course Objectives

By the end of this course, participants will be able to:

- Understand BIM concepts, standards, dimensions, and ISO 19650 principles
- Apply digital transformation and Industry 4.0 concepts in MEP workflows
- Implement BIM maturity levels, LODs, and information delivery strategies
- Design and model HVAC, electrical, plumbing, and fire protection systems in Revit
- Create fabrication-ready layouts, system legends, and schedules
- Collaborate and coordinate effectively across disciplines using Revit tools
- Generate construction documentation including sheets, callouts, and annotations

Course outline

The course comprises **64**-hours of theory and labs and is divided into **26** different Modules. Each chapter will be followed by hands-on lab exercises to reinforce learning and gauge understanding of the topics covered.

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Building Information Modeling (BIM)

Module 1: Foundations of BIM and Digital Transformation

1. Introduction to Building Information Modeling (BIM)
2. Digital Transformation in the Construction Industry
    - Definition and scope
    - Role of digital technologies in AEC
3. Advantages of Digital Transformation
4. Challenges in Digital Transformation
5. Relationship between BIM and Digital Construction

Module 2: Industry 4.0 and Its Impact on AEC

1. Overview of Industry 4.0
2. Concepts and Principles of Industry 4.0
3. Core Technologies Driving Industry 4.0
4. Impact of Industry 4.0 on the AEC Industry
5. BIM as a Key Enabler of Industry 4.0

Module 3: BIM Concepts, Uses, and Terminology

1. Introduction to BIM
2. Uses and Benefits of BIM
3. Core Components of BIM
4. Common BIM Terminology
5. BIM Dimensions Overview
6. Detailed BIM Dimensions
    - 3D BIM – Geometry
    - 4D BIM – Time & Scheduling
    - 5D BIM – Cost
    - 6D BIM – Sustainability
    - 7D BIM – Facility Management
    - 8D BIM – Safety
    - 9D BIM – Lean Construction
    - 10D BIM – Industrialized Construction

7. Evolution of BIM Dimensions

Module 4: BIM Maturity Levels and Lifecycle

1. BIM Maturity Levels – Overview
2. Level 0 BIM
3. Level 1 BIM
4. Level 2 BIM
5. Level 3 BIM
6. Benefits of Implementing BIM Maturity Levels
7. BIM Project Lifecycle
8. RIBA Plan of Work
9. Stages of the RIBA Plan of Work

Module 5: Level of Development (LOD) and Information Needs

1. Introduction to Level of Development (LOD)
2. LOD Definitions and Applications
    - LOD 100
    - LOD 200
    - LOD 300
    - LOD 350
    - LOD 400
    - LOD 500
3. Relationship Between LOD and LOIN
4. Importance of LOD in the AEC Industry
5. Benefits of Adopting LOD in BIM-Based Projects

Module 6: Information Requirements and Delivery Planning

1. Information Requirements – Overview
2. Organizational Information Requirements (OIR)
3. Asset Information Requirements (AIR)
4. Project Information Requirements (PIR)
5. Information Delivery Planning
6. Master Information Delivery Plan (MIDP)
7. Task Information Delivery Plan (TIDP)

Module 7: BIM Standards and ISO 19650 Framework

1. Overview of BIM Standards
2. Importance of ISO 19650
3. ISO 19650 – Part 1: Concepts and Principles
4. ISO 19650 – Part 2: Delivery Phase of Assets
5. ISO 19650 – Part 3: Operational Phase of Assets
6. ISO 19650 – Part 4: Information Exchange
7. ISO 19650 – Part 5: Security-Minded Information Management

Module 8: Document Management and Classification Systems

1. Document Naming Strategy – Introduction
2. Structure of Naming Conventions
3. Rules for Naming Standards
4. Classification of Categories
5. OmniClass Classification System
    - Elements by Function
    - Elements by Form
    - Products
6. UniClass Classification System – Systems, Elements / Functions

Revit MEPF

Module 9: Introduction to Autodesk Revit MEPF

1. Overview of Autodesk Revit MEPF
2. About Mechanical, Electrical, Plumbing & Fire Protection Systems
3. Role of Revit MEPF in BIM Projects
4. Coordination of MEPF with Architecture and Structure
5. Systems Templates in Revit MEPF

Module 10: Revit Interface and Project Setup

1. User Interface Overview
    - Ribbon, Properties Palette, Project Browser
    - View Control Bar and System Browser

2. Project Units - Mechanical, Electrical, and Plumbing Units
3. Linking CAD Files
    - Import vs Link CAD
    - Best practices for CAD coordination
4. Linking Files to Revit Project - Architectural and Structural model linking

Module 11: Levels, Grids, and Spatial Modelling

1. Levels
    - Adding and Modifying Levels
    - Creating and Editing Level Heads
    - Constraining Levels
2. Grids - Creating Grids, Modifying and Aligning Grids
3. Space Modeling
    - Creating Spaces
    - Creating Zones
    - Modifying Space and Zone Properties

Module 12: HVAC Systems – Fundamentals

1. Introduction to HVAC Systems in Revit
2. Creating an HVAC System
3. Understanding Air Terminals
4. Adding Air Terminals
5. Adding Air Equipment
6. Mechanical Control Devices
    - Air Handling Units (AHU)
    - Variable Air Volume (VAV) Boxes

Module 13: HVAC Ductwork Modelling

1. Ducting Overview
2. Creating Ducts
3. Flexible Ducts
4. Automatic Duct Routing
5. Manual Duct Routing
6. Creating Air Supply Systems

7. Creating Return Air Terminals
8. Checking and Analyzing Duct Systems
9. Creating Duct Legends

Module 14: HVAC Best Practices and Fabrication

1. Recommended Practices for Creating HVAC Systems
2. Generating HVAC System Layouts
3. Fabrication Details in Revit
4. Placing Fabrication Parts
5. Coordination and Clash Avoidance

Module 15: Electrical Systems – Fundamentals

1. Introduction to Electrical Systems in Revit
2. Reflected Ceiling Plan (RCP)
3. Lighting Fixtures
    - Wall-Mounted Fixtures
    - Overhead Fixtures
4. Type Properties of Lighting Fixtures

Module 16: Electrical Equipment and Power Distribution

1. Electrical Equipment
    - Placing Switchboard Components
    - Placing Panel Boards / Distribution Boards
2. Adding Power and System Devices
    - Electrical Fixtures
    - Lighting Devices
    - Communication Devices
3. Power Distribution Systems
    - Placing Conduits
    - Placing Cable Trays

Module 17: Electrical Circuits and Wiring

1. Creating Electrical Systems
    - Power Systems
    - Switch Systems

2. Circuiting
    - Setting Wires
    - Voltage Definition
    - Load Calculations
3. Wiring for Devices and Fixtures - Editing Wiring, Manual Wire Drawing

Module 18: Plumbing Systems

1. Introduction to Plumbing Systems
2. Adding Plumbing Fixtures
3. Specifying Pipe Settings
4. Routing Pipes in Pipe Systems
5. Modifying Pipe Segments
6. Placing Pipe Fittings
7. Placing Pipe Accessories
8. Adding Plumbing Equipment

Module 19: Fire Protection Systems

1. Introduction to Fire Protection Systems
2. Sprinkler Libraries
3. Fire Protection Piping Tools
4. Wet Fire Protection Systems
5. Dry Fire Protection Systems
6. Placing Sprinkler Heads
7. Connecting Sprinklers to Piping Networks

Module 20: Views, Detailing, and Documentation

1. View Management
    - Duplicate Views
    - Callouts
    - Sections
2. Detail Management
    - Annotations
    - Text Placement
    - Tags and Symbols

Module 21: Sheets and Project Output

1. Sheet Creation
2. View Management in Sheets
3. Title Blocks and Revisions

Module 22: Scheduling and Quantification

1. Scheduling in Revit MEPF
2. HVAC Schedules
3. Electrical Schedules
4. Plumbing and Fire Protection Schedules

Module 23: Collaboration and Coordination

1. Collaboration in Revit MEPF
2. Copy/Monitor
3. Worksets Creation and Management
4. View Templates Creation and Application
5. Multi-Disciplinary Coordination Best Practices

Navisworks

Module 24: Navisworks – Coordination and Clash Detection

1. Introduction to Navisworks
2. User Interface Overview
3. Navisworks File Types
4. Appending and Merging Files
5. Units Setup
6. Navigation and View Tools
7. View Orientations and Navigation Bar
8. Reference Views
9. Appearance Profiler

Module 25: Model Review, Clash Detection, and Simulation

1. Object Selection and Review

2. Selection and Search Sets
3. Saving Viewpoints
4. Review Tools
5. Clash Detection
    - Clash Tests
    - Clash Report Generation
    - Exporting Clash Reports
6. Timeliner and Construction Simulation
7. Scheduling and 4D Simulation

Module 26: Autodesk Construction Cloud / Autodesk Forma (BIM 360)

1. Introduction to Autodesk Forma
2. Account and Project Administration
3. Forma Data Management
4. Forma Design Collaboration
5. Forma Build – Project Management
6. Field Management and Site Execution
7. Model Coordination and Clash Detection
8. Integration with Autodesk and Third-Party Applications