KOENIG
step forward

Digital Manufacturing with Factory Design Utilities

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Target Audience

This professional course is designed for manufacturing engineers, plant and facility layout planners, digital transformation leads, PLM/CAD specialists, and Industry 4.0 practitioners who need to combine strategic digital-manufacturing thinking with hands-on Autodesk Factory Design Utilities skills. It assumes familiarity with basic CAD concepts and Windows operating environments; prior exposure to AutoCAD or Inventor is helpful but not mandatory. Professionals responsible for planning, digitizing, or optimizing production facilities — as well as those driving Industry 4.0 initiatives within a manufacturing organization — will benefit most from this course.

Course Outcomes

- Understand the core principles of Digital Manufacturing and Industry 4.0 and how they apply to factory layout planning.
- Apply digital-twin concepts to create a virtual representation of a physical production facility.
- Create 2D architectural base layouts representing building shells, walls, and facility structure.
- Apply the Factory Asset Library to populate a floor plan with manufacturing and material-handling equipment.
- Design and generate 3D factory layouts synchronized bidirectionally with 2D drawings.
- Develop custom factory assets not available in the standard library.
- Analyze facility layouts for interferences using clash detection and model coordination tools.
- Optimize layouts by identifying bottlenecks through process/material-flow simulation.
- Evaluate the role of IIoT, automation, and robotics in a connected digital factory.
- Implement change-management practices for rolling out digital manufacturing initiatives.
- Prepare a complete digital factory layout as a capstone deliverable.

Course Objectives

- Provide a structured progression from digital-manufacturing strategy and Industry 4.0 concepts into hands-on Factory Design Utilities execution.
- Build proficiency across the four core FDU applications (AutoCAD Architecture, Inventor, Factory Design Utilities, Navisworks).
- Develop workflow readiness for real-world digital factory projects, including asset placement, layout synchronization, and interference checking.
- Reinforce every concept through hands-on lab exercises and a capstone project mirroring real digital-manufacturing initiatives.
- Familiarize students with digital-twin, IIoT, and automation concepts alongside the practical tools used to realize them.
- Establish a foundation for leading or contributing to enterprise digital-manufacturing transformation efforts.

Course Outline

The course comprises 40 hours of theory and labs and is divided into 12 different chapters. Each chapter will be followed by hands-on lab exercises to reinforce learning and gauge understanding of the topics covered.

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Chapter 1: Introduction to Digital Manufacturing and Industry 4.0

- Defining digital manufacturing and its role in modern production environments
- Core pillars of Industry 4.0: connectivity, automation, data, and simulation
- The shift from traditional to digital factory planning
- Business drivers: agility, resilience, and time-to-market
- Overview of the Autodesk digital factory ecosystem
- Mapping the course journey from strategy to hands-on execution

Chapter 2: Digital Twins and the Digital Factory Concept

- Understanding digital twin concepts and their application to manufacturing facilities
- Building a virtual copy of a shop floor for planning and testing
- Benefits of simulating changes before physical implementation
- Data sources feeding a digital twin (CAD, sensors, process data)
- Digital twin maturity levels in manufacturing organizations
- Case examples of digital twins reducing physical prototyping

Chapter 3: Introduction to the Factory Design Utilities Workflow

- Overview of the Factory Design Utilities workflow within the Product Design & Manufacturing Collection
- Understanding how AutoCAD Architecture, Inventor, Factory Design Utilities, and Navisworks interconnect
- Reviewing typical digital factory project scenarios and deliverables
- Navigating the Factory Design Utilities interface and add-in tools
- Setting up a project environment and file structure for a factory layout project
- Understanding the one-to-one synchronization concept between 2D and 3D models

Chapter 4: Building the 2D Architectural Base Layout (AutoCAD Architecture)

- Creating and editing building shell geometry, walls, and structural elements
- Applying architectural styles and construction elements relevant to factory shells
- Working with layers, annotation, and drafting standards for facility drawings
- Importing existing site or building data as a layout foundation
- Placing doors, windows, and structural columns within the facility outline
- Preparing the 2D drawing for handoff into the digital factory workflow

Chapter 5: Factory Asset Library Fundamentals

- Understanding the structure and organization of the Factory Asset Library
- Browsing and searching for manufacturing and material-handling assets
- Placing, moving, and rotating assets within a 2D layout
- Editing asset properties and parametric dimensions
- Grouping and organizing assets by department or process area
- Managing asset catalogs and content libraries

Chapter 6: Creating 2D Factory Layouts

- Schematically laying out the factory floor using AutoCAD-based tools
- Populating the floor plan with equipment, conveyors, and material-handling assets
- Checking for bottlenecks and inefficiencies in the manufacturing process flow
- Annotating and dimensioning the factory layout for review
- Iterating on layout alternatives using familiar AutoCAD editing commands
- Validating layout accuracy against building constraints

Chapter 7: Generating and Working with 3D Factory Models (Autodesk Inventor)

- Converting a 2D factory layout into a 3D Inventor assembly model
- Exploring the synchronized relationship between 2D drawings and 3D models
- Navigating and reviewing the 3D factory model for spatial accuracy
- Editing 3D assets and propagating changes back to the 2D layout
- Adding custom objects and equipment unique to the layout
- Applying materials and visual properties to improve model communication

Chapter 8: Developing Custom Factory Assets

- Understanding when and why to create custom assets beyond the standard library
- Building parametric Inventor components for use as factory assets
- Configuring asset behavior, connection points, and metadata
- Publishing custom assets into the Factory Asset Library
- Testing custom assets within a live factory layout
- Maintaining and versioning custom asset content

Chapter 9: Model Coordination and Clash Detection (Autodesk Navisworks)

- Importing and aggregating AutoCAD and Inventor factory models into Navisworks
- Reviewing the combined model for spatial coordination
- Running clash detection between architectural, structural, and equipment elements
- Interpreting clash reports and prioritizing resolution
- Creating construction-phase simulations and scheduling sequences
- Communicating coordination findings to stakeholders using Navisworks review tools

Chapter 10: Process Analysis, Simulation, and Layout Optimization

- Introduction to process/material-flow analysis concepts for factory layouts
- Referencing Factory Design Utilities assets within process analysis workflows
- Running process simulations and reviewing throughput and bottleneck results
- Comparing layout alternatives using simulation outputs
- Applying findings to refine and finalize the factory layout
- Documenting the final layout and preparing project handoff deliverables

Chapter 11: Industrial IoT, Automation, and Robotics Integration

- Overview of Industrial IoT (IIoT) sensors and data streams in a connected factory
- Integrating automation and robotics considerations into layout planning

- Modeling automated material-handling systems within the digital factory
- Understanding edge computing and real-time data flow in production environments
- Evaluating safety and spacing requirements for automated equipment
- Planning for rapid change management as automation needs evolve

Chapter 12: Digital Manufacturing Strategy and Capstone Project

- Building a business case for digital manufacturing adoption
- Change-management practices for rolling out digital factory initiatives
- Governance, data management, and cross-team collaboration considerations
- Measuring ROI and performance outcomes of a digital factory project
- Capstone project: designing, simulating, and coordinating a complete digital factory layout
- Presenting and defending the capstone layout and its optimization rationale