Mechatronics Systems Design in Manufacturing Training Course

Professional Development Training Course Outline

Category	Manufacturing	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Mechatronics Systems Design in Manufacturing is a cutting-edge, interdisciplinary training course that integrates mechanical engineering, electronics, control systems, robotics, and intelligent automation to develop advanced manufacturing solutions. In today's rapidly evolving Industry 4.0 and smart factory ecosystem, organizations are increasingly adopting AI-driven automation, IoT-enabled systems, and cyber-physical production lines to improve efficiency, precision, and productivity. Mechatronics Systems Design in Manufacturing Training Course equips learners with the essential skills to design, analyze, and optimize mechatronic systems used in modern manufacturing environments.

The training emphasizes practical and industrial applications such as robotic automation systems, PLC programming, embedded systems, sensor integration, and smart production technologies. Participants will gain hands-on expertise in designing intelligent systems that enhance manufacturing scalability, predictive maintenance, energy efficiency, and real-time process control, preparing them for high-demand roles in advanced manufacturing industries worldwide.

Programme Curriculum

Mechatronics Systems Design in Manufacturing Training Course

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Course Objectives

1. Understand fundamentals of Mechatronics Systems Architecture
2. Apply principles of Industrial Automation & Smart Manufacturing
3. Design PLC-based control systems for production lines
4. Integrate IoT-enabled sensors in manufacturing systems
5. Develop robotic automation and motion control solutions
6. Implement AI-driven predictive maintenance systems
7. Analyze embedded systems for industrial applications
8. Apply CAD/CAM tools for manufacturing design optimization
9. Design cyber-physical production systems (CPPS)
10. Optimize industrial robotics for assembly line efficiency
11. Evaluate real-time control systems and feedback loops
12. Implement digital twin technology in manufacturing
13. Develop competency in Industry 4.0 smart factory solutions

Target Audience

1. Mechanical Engineers
2. Electrical & Electronics Engineers
3. Automation & Control Engineers
4. Manufacturing Engineers
5. Robotics Technicians
6. Industrial Maintenance Engineers
7. Engineering Students (Final Year & Postgraduate)
8. Technical Consultants in Smart Manufacturing

Course Modules

Module 1: Fundamentals of Mechatronics Systems

- System integration concepts
- Mechanical-electrical coupling principles
- Real-world automation examples
- Sensor-actuator basics
- System modeling fundamentals
- **Case Study:** Automated packaging system design in FMCG industry

Module 2: Industrial Automation Systems

- Automation hierarchy
- Factory automation architecture
- Industrial protocols overview
- SCADA systems introduction
- Control system components
- **Case Study:** Automated bottling plant control system

Module 3: PLC Programming & Applications

- PLC hardware configuration
- Ladder logic programming
- Timers and counters
- Industrial PLC troubleshooting
- HMI integration
- **Case Study:** Conveyor belt control system in manufacturing plant

Module 4: Sensor Integration in Manufacturing

- Types of industrial sensors
- Signal conditioning techniques
- Sensor calibration methods
- Data acquisition systems
- IoT sensor networks
- **Case Study:** Smart temperature monitoring in steel industry

Module 5: Actuators and Motion Control

- Electric, pneumatic, hydraulic actuators
- Servo motor control
- Motion control systems
- Position feedback systems
- Industrial applications
- **Case Study:** Robotic arm in automotive assembly line

Module 6: Robotics in Manufacturing

- Types of industrial robots
- Robot kinematics
- Programming robotic arms
- Collaborative robots (Cobots)
- Safety systems
- **Case Study:** Pick-and-place robotic system in electronics manufacturing

Module 7: Embedded Systems Design

- Microcontrollers overview
- Real-time operating systems
- Embedded C programming
- Hardware interfacing
- System debugging
- **Case Study:** Smart CNC machine controller

Module 8: CAD/CAM for Manufacturing Design

- Product design lifecycle
- 3D modeling tools
- CNC machining simulation
- Manufacturing process planning
- Design optimization
- **Case Study:** Automotive component prototyping

Module 9: Industrial Internet of Things (IIoT)

- IoT architecture in manufacturing
- Cloud connectivity
- Edge computing systems
- Data analytics integration
- Cybersecurity basics
- **Case Study:** Smart factory monitoring system

Module 10: Cyber-Physical Systems (CPS)

- CPS architecture
- Real-time system interaction
- Digital control loops
- Smart production systems
- System synchronization
- **Case Study:** Automated pharmaceutical production line

Module 11: Artificial Intelligence in Manufacturing

- Machine learning basics
- Predictive maintenance models
- AI-based quality inspection
- Anomaly detection systems
- Industrial AI applications
- **Case Study:** Defect detection in textile manufacturing

Module 12: Digital Twin Technology

- Digital twin concept
- Simulation modeling
- Real-time synchronization
- Performance optimization
- Virtual commissioning
- **Case Study:** Digital twin of an assembly plant

Module 13: Control Systems Engineering

- Feedback control systems
- PID controllers
- Stability analysis
- System response optimization
- Industrial control applications

- **Case Study:** Temperature control in chemical processing plant

Module 14: Smart Manufacturing Systems

- Industry 4.0 principles
- Smart factory design
- Data-driven manufacturing
- Automation integration
- Lean manufacturing synergy
- **Case Study:** Smart warehouse automation system

Module 15: Project Design & Industrial Implementation

- System design methodology
- Prototype development
- Testing & validation
- Industrial deployment strategies
- Project documentation
- **Case Study:** Fully automated production line design project

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

Ready to enroll or request a customized program? Book online or contact us:

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