

Introduction to Industry 4.0

COURSE OUTLINE

Catalogue Number	77-3301-0010
Category	Industry 4.0
Duration	15 Hours
Prerequisite Courses	None

Activity 1: What is Industry 4.0?

- The Industrial Revolutions
- The Taylor System
- Automation
- Leading up to Industry 4.0
- Factory of the Future
- Industry 4.0 Initiatives

Activity 2: Technologies that Drive Industry 4.0

- Industry 4.0 Technologies
- Cyber-Physical Systems
- Characteristics of the Smart Factory
- Industry 4.0 Design Principles
- Industry 4.0 Concepts

Activity 3: Challenges for Industry 4.0

- Previously Overcome Challenges
- Innovations and Challenges
- Industry 4.0's Answer
- Barriers to Industry 4.0 Integration
- Industry 4.0 Education

Activity 4: Quality 4.0

- The History of Quality Assurance
- Key Players in the Development of QA Principles
- QA Concepts

Genichi Taguchi

The Digital Twin

Activity 5: Supply Chain 4.0

Horizontal and Vertical Integration

Examples of Horizontal and Vertical Integration

The Industry 4.0 Supply Chain

Backwards and Forwards Integration

Deployment of Industry 4.0

Activity 6: Data Standardization

The Challenge

Data Mapping

Standardizing Data

Data Transposition

RAMI 4.0

Activity 7 Internet and Ethernet

History of the Internet

Client/Server Model

Internet Structure and Protocols

Ethernet: Definition and Functions

Ethernet Layers and the OSI Model

Activity 8: The Internet of Things

Examples of Things

Sensing and Communication

IoT Technologies

IoT Applications

IoT and Smart Manufacturing

Activity 9: Industrial Control Systems and IIoT

From IoT to the Industrial Internet of Things

Operational Technology Systems

Challenges for IIoT

Embedded Systems

SCADA Systems

The Cloud and the Edge

Activity 10: Big Data

Big Data: Definition and Importance

File Size and Storage

Applications of Big Data

Big Data Analytics

Big Data Analytics in Manufacturing

Case Study

Activity 11: Automation and Software Technologies

OT Systems

Enterprise Resource Planning

Manufacturing Execution Systems

Data Lakes

Interfacing ERP and MES

Cloud Computing Data Management

Activity 12: VR, AR, and AI

Virtual Reality – Definition and Examples

VR in Manufacturing

Augmented Reality – Definition and Examples

AR in Manufacturing

Comparing VR and AR

Artificial Intelligence – Definition and Examples

Machine Learning and Data Mining

Activity 13: Maintenance 4.0

Condition Based Maintenance

Risks and Costs

Maintenance 4.0 and Sustainability

Activity 14: Flexible Production

Flexible Manufacturing Systems

Customization

3D Printing

Examples of Flexible Manufacturing

Activity 15: Maturity Models for Industry 4.0

Maturity Models – Definition and Function

Levels and Domains

The SGMM Model

The IMAM Model

The Acatech Model

Closing Gaps Identified by Maturity Models