Principles of Process Manufacturing

Course description

This course provides a comprehensive introduction to modern manufacturing systems, blending historical context with current methodologies and hands-on application. Participants will explore the evolution of manufacturing from its origins to Industry 5.0, examine various production system types, and analyze performance metrics critical to operational success. Emphasis is placed on Lean Manufacturing principles, waste reduction, and quality control, including statistical approaches. Through practical exercises and real-world applications, students will gain the foundational knowledge and tools to understand, evaluate, and improve manufacturing processes.

At the end of the course you will able to:

- Identify and explain the basic concepts of the manufacturing process and its main elements.
- Describe the major events that shaped the history of manufacturing industries.
- Identify the different production systems and their main characteristics.
- Identify the main metrics used in manufacturing processes, their main characteristics, and how to use them.
- Identify the main concepts and characteristics associated with the Lean Manufacturing methodology and the application of the main tools.
- Identify the main characteristics of the MUDA concept and how to apply it.
- Explain the concept of quality and identify its main characteristics.
- Identify and use the tools commonly used for statistical quality control.

Main topics

1 Manufacturing Principles
- Basic manufacturing definitions and concepts
- What is manufacturing
- Basic Component if manufacturing

2 History of Manufacturing
- Pre-Industrial Revolution
- Industrial Revolution
- Lean Manufacturing
- Manufacturing 4.0
- Manufacturing 5.0

3 Types of Manufacturing Production Systems
- Repetitive Manufacturing
- Discrete Manufacturing
- Job Shop Manufacturing
- Continuous Manufacturing
- Batch Process Manufacturing

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Main topics

4 Manufacturing Metrics
- Productivity
- Efficiency
- Scrap
- Yield
- Line down
- Cycle Time
- Cost of Goods

5 Lean Manufacturing
- How everything started
- How lean manufacturing sees value.

6 Lean Tools
- 5s
- Gemba
- Visual Factory
- VSM

7 MUDA
- Overproduction
- Wait
- Transporting
- Overprocessing
- Inventories
- Movements
- Rework

8 Quality Overview
- What is quality
- Evolution of the definition of quality
- Peer evaluation in the artisanal age
- Statistical Controls
- Quality Inspections
- Quality management
- Quality at the Source

9 Intro to Statistical Quality Controls
- Prevention vs control
- Common causes vs Special causes
- Process control and process capability

10 Data Analysis Tools
- Histogram or stem-and-leaf plot
- Check sheet
- Pareto chart
- Cause-and-effect diagram
- Defect concentration diagram
- Scatter diagram

Contact

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Course features

Instructor Led

Duration: 12 hours

Tools and templates

Applied learning

Course certificate