

ADVANCING SUSTAINABILITY AND CIRCULARITY IN THE INDUSTRY 4.0 ERA

ACTIVITY SUMMARY

This training course provides manufacturing professionals with a comprehensive understanding of the principles of circular and sustainable manufacturing and the role of digitalization in enabling the transition toward more sustainable industrial practices.

LEARNING OBJECTIVES

Knowledge

- Principles and concepts for circular and sustainable manufacturing
- Digitalization and Industry 4.0 technologies
- Lean and Green methods
- Industrial use cases and examples

Technical skills

- Analyze a system to identify opportunities for improving sustainability and circularity
- Identify digital technologies that support sustainability and circularity
- Apply Lean and Green methods
- Plan practical improvement actions

Interpersonal skills

- Awareness of the evolving job roles and 'green skills' required to implement sustainability and circularity in manufacturing.
- Communicate sustainability goals, strategies, and performance to internal stakeholders
- Collaborate effectively across roles and functions

TEACHING APPROACH



FLIPPED CLASSROOM
APPROACH



SELF- PACED
LEARNING



BLENDED
LEARNING

TRAINING MATERIALS

ONLINE LEARNING PATHS / MODULES

HANDS-ON TRAINING

PRACTICAL TOOLS

FINAL TEST

TARGET AUDIENCE

- SMEs' Executives
- Production Managers
- Plant Managers
- Young professionals aiming for a career in manufacturing

ADVANCING SUSTAINABILITY AND CIRCULARITY IN THE INDUSTRY 4.0 ERA

SPECIFICATIONS OF THE ACTIVITY

FLIPPED AND BLENDED APPROACH

The training course is accessed via an online digital learning platform, offering flexibility and personalized learning experience for professional learners.

These learning paths are further extended with an onsite complementary hands-on training customizable by the organizations.

**MULTI-MODAL TRAINING APPROACH.
FUNDAMENTAL CONCEPTS OF CE AND
SUSTAINABILITY DELIVERED DIGITALLY.
CUSTOMISABLE HANDS-ON TRAINING.
PERSONALIZED LEARNING.**

ONLINE LEARNING PATHS

Online self-paced modules (15 minutes each)

Part 1. Circular Manufacturing Topics:

- Circular economy: definitions, roots, and business models
- Circular economy adoption in manufacturing
- Circular economy and digitalization
- Quiz

Part 2. Lean and Green Factory Topics:

- The concept of sustainability
- Lean management and sustainability
- Environmental sustainability performance
- Lean management tools
- Lean and Green case studies
- Quiz

**CIRCULAR ECONOMY DEFINITIONS
AND BUSINESS MODELS.
CONCEPTS OF LEAN AND
SUSTAINABILITY.
ADOPTION IN MANUFACTURING.
DEMONSTRATION OF USE-CASES.**

HANDS-ON PRACTICE

The online learning paths can be complemented by a range of practical sessions tailored to learners' or SMEs' specific needs, priorities, and learning objectives. These sessions may include group projects, challenge-based activities, hands-on practice in learning factories, simulations, and other experiential learning activities.

Below an example of a session where participants work as a team to redesign a manufacturing system according to circular economy principles, supported by lean methodologies and Industry 4.0 technologies.

Case Scenario: A manufacturing company wants to transition from a traditional linear model ("take-make-dispose") to a digital and circular factory.

A.1 - Circularity assessment (30 minutes). Teams analyse the current product life cycle and production process.

A.2 - Circular factory redesign (30 minutes). Teams redesign both the production process and the product lifecycle by integrating circular economy principles.

A.3 - Lean as an enabler of circularity and sustainability (30 minutes). Teams explore how Lean practices support circular objectives.

A.4 - Digital enablers for circularity and sustainability (30 minutes). Teams decide which and how digital technologies can enable their circular strategy.

A.5 - Performance dashboard (30 minutes). Teams design a dashboard to monitor progress towards a circular and sustainable factory.

A.6 - Final Pitch (30 minutes). Each team presents its Digital Circular Factory Transformation Plan to a panel acting as the company's executive board.

ADVANCING SUSTAINABILITY AND CIRCULARITY IN THE INDUSTRY 4.0 ERA

EVALUATION

FINAL ASSESSMENT

Successful completion of the course requires active participation in the learning activities and satisfactory performance in the assessment tasks, demonstrating both conceptual understanding and the ability to apply sustainability and circular economy principles in industrial contexts.

Quizzes are embedded in the online learning paths to evaluate understanding of key concepts such as sustainability, circular economy, lean methodologies, and digital technologies.

Successful completion of practical exercises, group projects or challenge-based activities demonstrate the ability to apply the theoretical concepts and methods to solve industrial problems.

SELF-REFLECTION

This evaluation focuses on reinforcing the learning outcomes. Here the participants self-reflect on the interplay between the concepts of both of the learning modules - circularity and lean, sustainable factory, their relevance and importance for a better manufacturing, and adaptation to meet the changing job roles to facilitate a sustainable manufacturing.

