



# TRANSFORMATIONAL TECHNOLOGIES

BODY OF KNOWLEDGE



# TRANSFORMATIVE TECHNOLOGIES

## BODY OF KNOWLEDGE 2024

### TOPICS

#### 1.0 Additive Manufacturing

Additive Manufacturing is the process of joining materials to make parts from three-dimensional (3D) model data, usually layer upon layer, as opposed to traditional subtractive and formative manufacturing methodologies.

1.1. Describe what is Additive Manufacturing

1.2. Discuss the history of Additive Manufacturing

1.3. Explain the strengths and limitations of Additive Manufacturing

#### 2.0 Artificial Intelligence (AI)

Artificial Intelligence is a branch of computer science devoted to developing data processing systems that perform functions normally associated with human intelligence, such as reasoning, learning, and self-improvement.

2.1. Describe the function of AI

2.2. Explain the history of AI in Manufacturing

#### 3.0 Augmented Reality

Augmented Reality or AR is an interactive experience of a real-world environment whereby the objects that reside in the real world are augmented by computer-generated perceptual information.

3.1 Define Augmented Reality and how this is an interactive experience of layering computer-generated elements to augment or enhance a real-world setting, typically using a mobile-friendly app.

3.2 Explain the history of Augmented Reality in Manufacturing

3.3 Discuss the three AR opportunities in the manufacturing areas of sales, service and training.

#### 4.0 Automation

Automation is the implementation of processes by automatic, technology-driven means.

4.1 Define what is automation

4.2 Describe the history of automation in manufacturing

4.3 Explain the types of Industrial automation

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#### 5.0 Digital Twin

A Digital Twin is a digital asset on which services that provide value to an organization can be performed, including services like simulation, analytics such as diagnostics or prognostics, recording of provenance (origin), and service history.

5.1 Define what is a digital twin

5.2 Discuss the benefits and challenges of Digital twins

#### 6.0 Generative Design

Generative Design is an Artificial Intelligence (AI) capability that can simultaneously generate multiple design options to be considered by human designers based on real-world input, manufacturing constraints, and product performance requirements.

6.1 Define what is Generative Design

6.2 Discuss the history of Generative Design

6.3 Discuss the benefits and challenges of Generative Design