Institute of Science and Technologie

Department of Science and Technology / Study: Process Engineering Module: Engineering professions / Semester 2 / Section A

Chapter III:

Automation and Industrial Engineering sectors

3.1 Definitions

3.1.1. Industrial automated lines

The industrial production chain is all of the manufacturing operations necessary for the production of a manufactured product, from raw materials to placing on the market.

A production system is said to be automated when it can autonomously manage a pre-established work cycle which is broken down into sequences or steps.

The advantages that automation offers you:

• Cycle times for parts in your production line are optimized.

• Production costs are reduced.

• Saving energy and reducing your waste.

• Space in your production unit is better used.

• Product quality and reliability are improved.

• The risk of error is reduced.

3.1.2. Machine tools to digital control

Digitalization is always associated with new technology. The numerically controlled machine tool (MOCN) is a specific device controlled by numerical control via a computer.

A numerical control brings together all the hardware and software that are used to order the movements that the machine tool must execute.

All of this machine tool control information is developed in the form of a program with sequential execution. The response times of such commands are around ten microseconds.

3.1.3. Robotics

Robotics is a field of activity covering the study, design and manufacture of robots or automated machines. It involves skills in computers, electronics and mechanics.

A robot is defined as a machine equipped with sensors, actuators and a logic system.

3.1.4. Inventory management

Inventory management, a strategic element of the supply chain, refers to tracking inventory from manufacturers to warehouses and then to a point of sale.

Inventory management used to have the right products in the right place at the right time.

The goal of inventory management is to minimize the cost of holding merchandise by helping you know when it is time to restock products or repurchase your raw material to make them.

The different types of stocks:

• Raw materials.

• Products in progress (WIP).

• Finished products.

• Maintenance, repair and operating (MRO) goods.

3.1.5. Management of goods traffic.

The merchandise is the object intended for sale. In principle, goods are tangible goods, but by extension we speak of market services to designate standardized services which are produced and sold publicly under the same conditions as goods.

Traffic management systems make it possible to define appropriate measures to reduce the number of accidents and the impact of delays on the road circulation of goods.

The objectives of freight traffic management:

1. The drop in carrier traffic.
2. Acceleration of delivery frequencies.
3. Reduction of stocks at points of sale.
4. Reduction of delivery costs.

The use of new information and communication technologies provides significant assistance in solving transport and traffic problems.

3.1.6. The quality

L’association française de normalisation (AFNOR) définie là comme étant « L’aptitude d’un produit ou d’un service à satisfaire les besoins des utilisateurs ».

The International Organization for Standardization (ISO) presents a similar definition: “it is all the properties and characteristics of a product, process or service which give it its ability to satisfy expressed or implicit needs”.

A few words to summarize these definitions:

• Compliance with standards.
• The ability to satisfy user needs.
• Closer to desire than need.

3.2. Application areas

3.2.1. Automatic

The industrial engineering specialty is based in particular on computer engineering and automation, enhanced by human sciences and management. It makes it possible to understand complex technical and human systems in their entirety, to analyze them, model them, simulate them, develop them and optimize them.

Industrial engineering as a discipline focuses on examining how to do things better.

This engineering discipline concerns: the design and management of processes and systems that improve the quality and productivity of the supply chain of companies.

Industrial engineering provides a systematic approach to rationalizing and improving the productivity and efficiency of organizations, whether governmental or private.

The term industrial is not limited only to the size of manufacturing or manufacturing workshops. It is recognized that industrial engineers have the technical training to make improvements to a manufacturing system.

3.3. Role of the specialist

3.3.1. Automation engineer

Main mission;

The automation engineer is an automation professional in the company.

The automation engineer designs and implements complex automated systems.

Activity Principal:

➢ Creates the general architecture of a machine or an automated production line.

➢ Follows and manages a technical project.

➢ Carry out programming and commissioning of machines.

Tasks :

• Analyzes the operations to be carried out, in conjunction with the production department.
• Writes the specifications taking into account the needs expressed.
• Defines and designs the architecture of an automated production line.
• Organizes and manages the project while respecting the schedule.

• Leads technical and financial negotiations with suppliers.

• Ensures the programming of PLCs, defines and monitors the tests as well as the start-up of the machines.

• Trains and advises users of automated equipment and services.

SKILLS :

• Mastery of Computer Aided Manufacturing Design (CAD/CAM) software.

• Masters Computer-Assisted Group Technology (CGAO).

• Uses Integrated Management software packages.

• Provides technical support to quality, maintenance and methods services.

• Ensures compliance with quality standards.

• Organization, project management and planning.

• Managerial qualities.

• Sense of listening and service.

• Sense of negotiation.

• Technology watch.

• Technical mastery of English.

Perspectives of evolution

• Project Manager.

• Design office director.

• Production director.

• Industrial production director.

3.3.2. Industrial engineer

Main mission :

The industrial engineer designs and manages the industrialization of products. The industrial engineer contributes to optimizing the performance of the industrial organization.

Main Activity:

➢ Optimizes and validates production processes.

➢ Definition of product manufacturing processes.

Tasks:

• Validates feasibility studies, approval and qualification plans.

• Creates the manufacturing file: choice of procedures, writing of instruction sheets for the production department.

• Participates in the definition of manufacturing processes for new products.

• Arbitrates and allocates means and resources (human, financial, deadlines, materials, etc.).

• Controls the conformity of production processes with the specifications.

• Analyzes production costs, defines cost prices.

SKILLS :

• Performs an internal audit.

• Mastery of Computer Aided Design and Drawing (CAD) software

• Implements a continuous improvement process.

• Manages and manages a budget.

• Mastery of Computer Aided Manufacturing Design (CAD/CAM) software.

• Mastery of computer-assisted maintenance management (CMMS) software.

• Masters work organization methods.

• Masters and integrates problem solving methods and tools.

• Respects quality standards.

• Performs maintenance procedures.

• Complies with Quality, Health, Safety and Environment (QHSE) rules.

• Analyzes production activity data.

• Provides technical support to quality, maintenance and methods departments.

• Directs a service or structure.

• Negotiates a contract.

Perspectives of evolution:

• Production director.

• Project Manager.

• Head of Service.

• Industrial production director.