**Institute of Science and Technologie**

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

# Chapter I:

# Sectors of Electronics, Telecommunications, Biomedical Engineering, Electrotechnics, Electromechanics, Optics and Precision Mechanics.

## 2.1 Definitions

### 2.1.1 Automation

Home automation is the set of electronics, building physics, automation, IT and telecommunications techniques used in buildings and making it possible to centralize the control of the various systems and subsystems of the house and of the company.

### 2.1.2. Automotive embedded systems

An embedded system is defined as an autonomous electronic and computing system, often in real time, specialized in a specific task.

The in-vehicle system works in conjunction with various automotive and external in-car systems to provide entertainment and information to passengers and to the driver.

The three main areas of the future are the electric car, the connected car and the automated car. On-board electronics are transversal to all of this. It will play a role in functions as diverse as electric charging management, engine control, vehicle connectivity to its external environment, and even driver assistance systems.

### 2.1.3. Video surveillance

Video surveillance (or video protection) is a system of cameras and image transmission, placed in a public or private space to monitor it remotely, it is therefore a type of remote surveillance. The general objective of a video surveillance system is to contribute to the security of property and/or people. This contribution can focus on various components, often intertwined: Crime prevention, Security, Road and industrial safety.

### 2.1.4. Mobile telephony

Mobile telephony is an electronic telecommunications device, normally portable, offering a mobile telephony function and can be used over large distances subject to network coverage.

### 2.1.5. Optical fiber

An optical fiber is a glass or plastic wire through which the internet passes. Optical fiber allows a faster connection than the traditional copper network.

The fiber is a dielectric; it does not present a spark risk. The signal loss in optical fiber is lower than that of copper wire.

Optical fiber represents a qualitative medium to offer high speeds to all users of the Internet network.

### 2.1.6. Scientific instrumentation

A scientific instrument is an instrument used in science, allowing data acquisition, measurement or observation, from nanometric and micrometric scales, to macroscopic scales.

Most of the time, these are measuring instruments (spectrometers, multimeters, etc.) or observation instruments (photographs, seismographs, spectroscopes, polarizing microscopes ...).

### 2.1.7. Medical instrumentation

The term Medical Devices covers a wide range of medical instruments used in the treatment, reduction, diagnosis or prevention of a disease or physical condition.

### 2.1.8. Giant mirrors

A mirror in optics is a reflective surface. Mirrors, as opposed to so-called “refractive” elements such as diopters and lenses, are called “reflective” elements.

The quality of a mirror depends greatly on that of the surface of the support, generally made of glass. This surface is expected to be as uniform and smooth as possible.

### 2.1.9. Contact lenses

A contact lens, also called a contact lens, is a corrective, cosmetic or therapeutic lens placed on the cornea of the eye. You will be happy to know that there is no fixed age range for wearing contact lenses.

### 2.1.10. Transport of electrical energy

Electric power transmission is the massive movement of electrical energy from a production site, such as an electrical production plant, to an electrical distribution station. Most transmission lines are three-phase alternating current at high or very high voltage.

### 2.1.11. Electrical energy distributions

Electric power distribution networks are local networks that allow energy to be transported directly to consumers (loads) via a network of overhead power lines or underground cables. Consumers of electrical energy are either low voltage (LV) or medium voltage (MT).

A distribution network is generally organized radially, with each point of connection to the medium voltage network serving a “tree” subdividing several times before reaching the distribution transformers.

### 2.1.12. Electricity production plants

Electric energy is produced in power plants which have elements essential to the generation of electric current. The production of electricity is ensured by the conversion into electrical energy of primary energy which can be either mechanical, chemical, nuclear, or renewable energies.

### 2.1.13. Energetic efficiency

The notion of energy efficiency of a system, in physics, is defined by the ratio between the level of useful energy it delivers and that of the energy consumed, necessary for its operation.

The search for optimal energy efficiency leads to a major advantage on an economic level, through the gain obtained in terms of operating or usage costs in the long term (lower energy consumption).

### 2.1.14. Maintenance of industrial equipment

Industrial maintenance is all operations intended to prevent or repair breakdowns that occur on machines.

It not only limits breakdowns, but above all prevents possible failures, and this is a great help in saving time and improving the productivity and profitability of a factory. The main types of industrial maintenance are: corrective maintenance, preventive maintenance, and predictive (forecast) maintenance.

### 2.1.15. Elevators

Elevating device for transporting people in a cabin moving between vertical guides, or slightly inclined vertically. Boat lift ensuring the connection between two reaches of different levels.

There are essentially two types of elevator families: cable traction elevators and hydraulic elevators.

### 2.1.16. Wind power

A wind turbine is an electrical machine used to transform the kinetic energy of the wind into mechanical energy, which is itself converted into electricity when several wind turbines are installed on the same site, we speak of a wind turbine “park” or “farm”.

### 2.1.17. Solar energy

Solar energy is obtained by the energy of the sun's radiation. More precisely, the principle is to transform the energy carried by the photons in light into electricity or heat.

Solar energy is an energy source that is dependent on the sun. Thanks to this energy, it is possible to produce electricity without pollution.

## 2.2. Application areas

### 2.2.1. Electronic

Electronics is a branch of applied physics, dealing, among other things, with the shaping and management of electrical signals, making it possible, for example, to transmit or receive information. The adjective “electronic” also designates what is related to the electron.

### 2.2.2. Telecommunications

Telecommunications is defined as the transmission of information over distance using electronic, computer, wire, optical or electromagnetic transmission technologies.

They are thus distinguished from the post office which transmits information or objects in physical form.

### 2.2.3. Biomedical genius.

Biomedical engineering is an application of engineering principles and techniques in the medical field aimed at the control of biological systems or the development of devices used for the diagnosis and treatment of patients.

This field is a blend of medicine, biology, engineering and physics. Clinical engineering is a branch of biomedical engineering for professionals responsible for equipment management in hospitals.

Apply the most advanced sciences and techniques to the design and management of medical devices (diagnostic, treatment and assistance devices) and to the development of information systems with the aim of improving the quality of care and patient care.

### 2.2.4. Electrotechnics

Electrical engineering is the study of the technical applications of electricity, or the discipline which studies the production, transport, treatment, transformation and use of electrical energy**.** Electrical engineering is closely linked to electronics and automation to which it frequently uses, in particular for controlling machines.

Traditionally, electrical engineering is associated with high currents as opposed to weak currents which would be the exclusive domain of electronics.

### 2.2.5. Electromechanical

Electromechanics is the combination of electrical and mechanical techniques. Electromechanics combines the advantages of electricity and those of mechanics, and thus makes it possible to optimize existing mechanical systems or to design new, even more efficient ones.

### 2.2.6. Optical

The paramedical optics sector offers many opportunities and career prospects. The optical specialty plays a major role in the care pathway alongside ophthalmologists and orthoptists to provide suitable optical equipment.

### 2.2.7. Precision engineering

Precision mechanics is the science, art and practice of engineering mechanical systems that must be manufactured to exact tolerances.

Precision mechanics is part of the mechanical engineering discipline and it turns out that this person's tasks are very similar to those of an engineer.

By precision mechanics, we mean the manufacturing of mechanical parts that do not allow any defects to occur. The use of these parts has the same name.

### 2.3. Role of the specialist

There are many engineering professions. Generally speaking, an engineer will aim to work on a project or respond to a mission to improve processes or products. The offers for the engineering profession are numerous and in high demand, engineering professions bring together many positions that are very different from each other.

Generally, to access this profession, you must complete engineering or technical master's level training. Discover all the jobs you can apply for in the engineering sector.

#### 2.3.1. Electronics engineer

The electronics engineer is responsible for designing new electronic components or materials, or participating in their production. It is the centerpiece in the appearance of new innovations in our daily lives, whether for the general public or professionals.

The electronics engineer can occupy very specific positions:

• If working in research, the electronics engineer will be responsible for developing technological innovations while respecting the deadlines and costs imposed.

• In the manufacturing sector, the electronics engineer will be responsible for planning and organizing the work of teams.

• The test engineer will be responsible for creating the prototype and testing it in order to verify that it corresponds to what was planned.

• The business engineer is attached to the sales department. A fine connoisseur of his products and their manufacturing, he designs tailor-made products for his customers, adapted to their needs. He is able to conduct negotiations and develop an argument to sell his products.

#### 2.3.2. Telecommunications engineer

The telecommunications engineer is also called a telecom network engineer, telecoms engineer, telecoms manager or information systems engineer. Are responsible for developing communication techniques by landline, mobile telephone, internet and optical fibers.

The telecommunications engineer designs telecommunications equipment or systems, whether telephone exchanges, software, transmission tools, components or even circuits intended for mobile phones. He will therefore mainly work in large groups linked to telephone networks.
However, he can also work as a consultant for engineering consulting companies. The telecommunications engineer can also specialize in the aeronautics or aerospace sector.

### 2.3.3. Biomedical engineering engineer

The work of the biomedical engineer is essential to ensure the quality and safety of care: equipment (electric syringes, dialysis machines, or imaging devices such as scanners or MRI) play a vital role in the diagnosis and treatment of patients.

Working mainly in a public hospital, the biomedical manager is responsible for the management of all medical equipment in the health establishment, from small equipment to very large medical devices, including machines used in intensive care or in operating room.

### 2.3.4. Electronic engineer

The main route to becoming an electrical engineer is to go through an engineering school and obtain an engineering diploma or master's degree with a specialization in electrical engineering or electrical engineering.
The electrical engineer develops and industrializes electronic components. Its job consists of adapting the discoveries of physicists to the industrial sector, in the form of technological advances.

### 2.3.5. Electromechanical engineer

The electromechanical engineer plays an essential role in a company because he ensures the continuity of production by ensuring the proper functioning of all machines.
His knowledge of all the electrical, electronic and mechanical elements of all equipment allows him to carry out the various missions for which he is responsible. The first of these is the maintenance and upkeep of the machinery fleet.
His task is to control them and ensure their operation. It thus carries out the usual maintenance tasks to prevent the risk of failure and malfunction: adjustment, cleaning, lubrication, changing worn or defective elements.

### 2.3.6. Optical engineer

The optical engineer designs and develops the production of instrumental optics and photonics instruments in sectors such as aeronautics, astronomy and telecommunications. The optical engineer specializes in the design and control of complex optical systems such as astronomy devices or camera lenses.

The optical engineer can perform various functions, in various locations.

• In the factory, he plays the role of production engineer. Responsible for the direction of optical instrument manufacturing.

• In the design office, the optical engineer is responsible, in collaboration with other scientists, for calculations and studies for the improvement of existing optical instruments and the creation of new models.

• In the laboratory, he became a research engineer.

• Finally, as a technical salesperson, the optical engineer mobilizes his technical skills to participate in the sale of instruments.

### 2.3.7. Precision mechanical engineer.

A precision mechanic must have good eyesight as well as good motor skills. He must be able to work quickly and accurately without making errors. He must also be able to understand how objects work in order to be able to repair them in the event of a breakdown**.**

### 2.3.8. Renewable energy engineer.

The renewable energy engineer is in constant search of improving new energy techniques. It analyzes and evaluates existing techniques with a view to making them even more efficient and also seeks to develop new ones, whether in the wind, photovoltaic or geothermal sectors.

Whatever his objective, the renewable energy engineer must respect the environmental standards in force as well as technical and regulatory constraints.

Responsible for evaluating and improving existing techniques, the renewable energy engineer focuses on studying, for example, how to increase the performance of a solar collector, a geothermal borehole or a wind turbine. Another mission of the renewable energy engineer, creation and innovation are already part of the energy transition.

While taking into account existing standards and regulations, it is constantly looking for new techniques and new sources of energy to use.