Learning objectives of the subject

It is tried that the student knows the importance that the industrial maintenance in the production systems represents, as well as the different techniques from support which they can be used to be able to detect failures, besides the reliability study the components, equipment and systems that form a productive system.
Basic principles of the industrial maintenance

Description:
Objectives
To present the purpose the maintenance, the types of maintenance according to the characteristics of the industrial system and the tools for its control.

Contents
1.1 Introduction to the maintenance.
1.2 Type of maintenance.
1.3 Study of the lack.
1.4 Analysis of maintenance costs.
1.5 Data to gather.

Activities, knowledge, abilities, aptitudes
- To identify the purpose of the maintenance.
- To be able to apply in each case the type of suitable maintenance more.
- To apply the tools of control of correct form.

Planning
This module is the basic one and has a direct relation with the other modules.

Commentaries
This module is summarized in chapter 1 of the book of the bibliography. Fernandez Cabins and other Techniques for the maintenance and diagnosis of rotating electrical machines.
## Reliability

### Description:

Objectives
To apply the calculation of reliability in concepts of industrial maintenance.

Contents
2.1 Concepts of reliability.
2.2 Reliability with constant failure rate. Exponential model.
2.3 Reliability with nonconstant failure rate. Weibull model.
2.4 Reliability of systems.

Activities, knowledge, abilities, aptitudes
- To apply the concepts of reliability within the maintenance.
- To work with a program of calculation of reliability, (Minitab).
- To observe the power of this element of calculation.
- To identify the results with the industrial reality.

Planning
Although this module is independent, can help us to make decisions respect to which we will speak in other modules.

Commentaries
Chapter 12 of book R. Companys, A. Corominas Organization of the production and design of productive systems. The book Eulàlia Grifull Industrial Reliability. Of this book the reliability practices will be based that will become like work in house.
**Techniques of measurement**

**Description:**
Objectives
To know the different techniques to measure the most important parameters that they are used in the maintenance.

Contents
3.1 Electronic equipment.
3.2 Equipment for the analysis of the isolation.
3.2 Transducers.

Activities, knowledge, abilities, aptitudes
- To differentiate the different equipment that is in the market.
- To determine that equipment is adapted according to its benefits

Planning
It has direct relation with all the modules.

Commentaries
Capitol 3M. Fernandez Cabins and other Techniques for the maintenance and diagnosis of rotating electrical machines

**Analysis of vibrations**

**Description:**
Objectives
To introduce the techniques of the analysis of vibrations applied to the maintenance.

Contents
4.1 Analysis of vibrations.
4.2 Analysis of the characteristics.
4.3 Interpretation of the data.

Activities, knowledge, abilities, aptitudes
- To identify the main parameters of the analysis of the vibrations.
- To apply these parameters to the possible defects.
- To analyze the obtained results.

Planning
It has relation with module 1 and 2

Commentaries
Chapter 4 of the book: M. Fernandez Cabins and other Techniques for the maintenance and diagnosis of rotating electrical machines
Other techniques of maintenance

**Description:**

Objectives
To use the different techniques from maintenance that exist at the moment within the market, to be able to apply most suitable in each case.

Contents
5.1 Thermography.
5.2 Analysis of currents.
5.3 Acoustics.

Activities, knowledge, abilities, aptitudes
- To identify the existing techniques of maintenance in the market.
- To analyze its utility.
- To relate each of these techniques in real cases.

Planning
It has relation with the module 1 and module 6

Commentaries
Chapter 5 Ms. Fernandez Cabins and other Techniques for the maintenance and diagnosis of rotating electrical machines.
# Implantation of a maintenance system

**Description:**

Objectives  
To plan the implantation of a system of maintenance from an example being followed the correct steps, so that their implantation is effective.

Contents  
6.1 Description of the plant.  
6.2 Steps to implement the system.  
6.3 Selection of the techniques.  
6.4 Organization of the implantation.  
6.5 Valuation of the system.

Activities, knowledge, abilities, aptitudes  
- To plan the implantation of a system of maintenance in a concrete industry.  
- To organize the different stages.  
- To evaluate the system proposed with respect to the present system.

Planning  
It has relation with all the previous modules.

Commentaries  
### Practicals of reliability

**Description:**
Objectives
To solve different exercises on reliability, that they will help to include/understand the theoretical explanations.

Contents
P1 Representation of the failure rate.
P2 Resolution of an exercise with the Excel program
P3 Resolution of an exercise with the Minitab program
P4 censured Data. Excel.
P5 censured Data. Minitab

Activities, knowledge, abilities, aptitudes
- To differentiate the different mechanisms from calculation.
- To solve reliability exercises.
- To deduce the collected data.
- To relate them in cases of application to the maintenance.

Planning
Direct relation with module 2

Commentaries
Manual of reliability practices. Eulalia Grifull industrial Reliability
## Practical of vibrations

**Description:**

Objectives
To actually apply to the theoretical concepts of the analysis of vibrations with a simulator of lack and its equipment of analysis of vibrations

Contents
7.1 Description of the equipment.
7.2 On-speed operation. Obtaining of the landlords.
7.3 Imbalance.
7.4 Misalignment
7.5 Lack in bearings and gears.

Activities, knowledge, abilities, aptitudes
- To manipulate a real equipment of analysis of vibrations.
- To obtain the results of the measures.
- To analyze the results verifying with the obtained landlord.
- To detect the lack to that the measurement corresponds.

Planning
It has relation with module 4

Commentaries
Manual of practices (digital Campus)
Chapter 4 of the book:
M. Fernandez Cabins and other Techniques for the maintenance and diagnosis of rotating electrical machines
Work on one of the proposed subjects

Description:
Objectives
To deepen in one of the subjects of the subject that set out to course principle. This work will be realized in equipment and will consist of an oral presentation on the part of the members of the equipment.

Contents
The works to choose by each group will be:
- Thermography.
- Analysis of vibrations.
- Acoustic.
- Analysis of currents.
- Maintenance TPM.

Activities, knowledge, abilities, aptitudes
- To deepen in a subject.
- To apply the work in equipment.
- To realize an oral presentation.

Planning
It has relation with the previous modules, and mainly with the module corresponding to the selected subject.

Commentaries
One is to look for specific bibliography of the selected subject.

Qualification system

0.30 NF = C1 + 0.5 C2 + 0.1 0.1 P + T
C1 = Note of the partial test.
C2 = Note of the final test.
Practical P = Note.
T = Work in group.
Bibliography

Basic:


M. Fernández Cabanas y otros.


Complementary:
