16209 - SPIN-U3T07 - Integrated Production Systems

**Teaching staff**

**Coordinator:** CRISTOBAL RAYA GINER

**Prior skills**

It is recommended to have previous knowledge in industrial automatization. Subject SPIN has a place Web with educational contents of support. It connects URL: http://bibliotecina.upc.se/factoria/projectes/epsevg/spin/

**Requirements**

To have attended subjects ENCO and MOSS previously

**Learning objectives of the subject**

The subject tries:
- The formation of the student from the point of view of the multidisciplinary treatment of contents
- To make to the student like expert engineer in technological aspects of supervision and automatization apt
- Application of the learning based on problems/projects PBL to the area of the automatization
- To affect the aspect of systems integration from the hierarchic level of supervision to the level plant inferior
Content

Foundations

**Description:**
1. Foundations
   1.1 Definition of automatic, automatization and production
   1.2 Integrated systems of manufacture (CIM)
   1.3 Management of the production
   1.4 Presentation of the practical activities of the subject

Activities, knowledge, abilities, aptitudes
When doing this module the student must know:
- to identify the agents who take part in a productive system
- to value the multidisciplinary cooperative work in real industrial projects

Planning
The module is a basic introduction necessary to clearly focus the contents of the subject

Commentaries
The reading of magazines specialized of the sector is recommended like for example:
- Automatic and Instrumentation I recommends the reading of the chapter 2 ¿General Concepts of Management of the Production¿ of the reference

supervision

**Description:**
2. Human supervision inside control room
   2.1 Definitions of monitoring, supervision, SCADA
   2.2 Industrial control room
   2.3 Design of supervision interface
   2.4 Formation of workers in control room
   2.5 Industrial examples

Activities, knowledge, abilities, aptitudes
When the finishing this module the student must be able to recognize the problems that are in the industrial control rooms, to contribute specifications for the improvement of the security of the supervision systems and to learn to design new interfaces with methodologic criteria.

Planning
This module complements the explanations supplied in the previous modules and allows to contemplate the information flow enters plant and the systems in charge of the management of the production.

Commentaries
There are few books in this matter. One of most recommendable is some precise chapter of the book ¿for Practical SCADA industry¿ of D. Bailey. Respect to the training of workers makes lack mention the case of the simulator of the CTA, directed by the Dr. Caesar of Prairie, where is an example of simulator for the training of workers of industrial control room.
3. Programming of SCADA In TOUCH

3.1 Edition and animation of objects
3.2 Monitoring of the modular system of production
3.6 Design of interfaces with SCADA In TOUCH
3.7 Monitoring of a chemonuclear reactor with In TOUCH
3.8 Communications of software In TOUCH with other resources (PLC, MATLAB, servant OPC)
3.9 Remote control with In TOUCH

Activities, knowledge, abilities, aptitudes
When the finishing this module the student must be able to identify the workstations that are integrated in the modular system of production and to value the necessity to design interfaces of monitoring and supervision to size.

Commentaries
To emphasize the memories of PFC realized previously by other students like for example:
- Beginning of PLC CJ1M and integration in network of PLC's by means of DEVICENET. Xavier Parladé
- Beginning of PLCs SIEMENS S7-300 with communication PROFIBUS Courteous DP.Alejandro

4. She guides GEMMA

4.1 Methodology
4.2 Graphical representation
4.3 Study of situations
4.4 Valuation of the use of the guide

Activities, knowledge, abilities, aptitudes:
When the finishing this module the student has to assimilate a new method that allows the improvement him of the productive systems applying guide GEMMA of rigorous form

Planning
This module is related to module 5 where the concepts are applied to study of cases

Commentaries
It is important to emphasize a series of places Web that opportunely will be indicated by the professor.

5. Applied guide GEMMA inside PLC and PC

5.1 Ways of march and shutdown
5.2 Verification with order/disorder
5.3 Design of control panel
5.4 Process of treatment of the thread in coil (PIRELLI CABLE)

Activities, knowledge, abilities, aptitudes
When finalizing this module the student must:
- to solve automatization problems everything applying guide GEMMA

Planning
To see Module 4 Commentaries See Module 4.

SYSTEMS OF FLEXIBLE MANUFACTURE

Description:
6. Systems of flexible manufacture (SFF)
6.1 Definition
6.2 Methods of work: Flow Shop, Job Shop and SFF
6.3 Integration of cells and stations in systems SFF
6.4 Automated transport and warehouses
6.5 Modular system of production
6.6 Examples

Activities, knowledge, abilities, aptitudes
When finishing this module the student must be able to have a professional perspective on the industrial systems of manufacture. It must learn to value the importance of the multidisciplinary work for the accomplishment of automated systems complex.

Planning
The module is on the one hand an academic and formal introduction, but it also contemplates examples of industrial systems that enrich the academic vision. This module is related to module 7 where to design techniques of and system analysis of manufacture are applied.

Commentaries
The re-reading of the book is recommended
- Modeled and simulation of Toni Guasch, M.A. Piera, Editions UPC in the passages that modeled reference does to with Networks of Stony and simulation with SAND
- The bibliographical search is also recommended from scholargoogle in the area of
- Discrete-even simulation

DESIGN AND ANALYSIS OF SFF

Description:
7. Design and analysis of SFF
7.1 Design of modular system of production
7.2 Design of automatization laboratory
7.3 Management of the production of Machine-Tool
7.4 Robotized station: modeled with Network of Stony, simulation with SAND
7.5 Study of station formed by machines in sequence

Activities, knowledge, abilities, aptitudes
When the finishing this module the student must demonstrate its competition in the ability to design manufacture systems and to use tools of modeled and simulation to analyze the behavior of productive systems and to contribute lines of improvement.

Planning
To see the planning of Module 6

Commentaries
To see commentaries of Module 6.

CONCLUSIONS

Description:
8. Conclusions
8.1 Companies of the industrial sector
8.2 Projects

Activities, knowledge, abilities, aptitudes
- The student must be able to recognize those companies related to the modules commented throughout the subject

Planning
This module is the conclusion of which it has been explained to the subject

Qualification system

The qualification of the subject considers all the work carried out throughout the course. The final qualification is obtained to apply the following formula:

\[ NF = 0.35 \times \text{LAB} + 0.20 \times \text{EXLAB} + 0.2 \times \text{EXP1} + 0.25 \times \text{EXP2} \]

where: LAB: Laboratory Work, EXLAB: Laboratory Individual test, EXP1: First partial exam, EXP2: Second partial exam. Laboratory work laboratory work will be done in groups.
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Bibliography

Basic:


Pere Ponsa, Ramon Vilanova. *Automatización de procesos mediante la guía GEMMA*. Edicions UPC Aula Politècnica / Computación y Control, nº 102, 2005.

Complementary:


