



Electrical Power Analysis Learning And Implementation In One2One Project

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Abstract

This paper presents a didactical project for vocational education in electrical field under the European Longlife Learning Programme - Transfer of innovation - with the title "One2One - One Teacher and One Student working with ProjectX". The ProjectX is a methodological guide for the student to carry out a concrete activity, one to one with the teacher, in which theory and practice are both perfectly integrated and is related to the real workplace. In the theoretical part, students will learn about the key elements of an electrical installation that refers to: the main types of loads, the electrical system capacity, the cables choice, checking the protection of electrical equipment, protection of persons, power factor and harmonics. They will also know the parameters for estimating main characteristics of electrical networks. After learning and testing, the students will perform the practice that has as main objective the achievement of energy assessments. At the end of this ProjectX, students will be able to realise a preventive or corrective maintenance for a best energy efficiency, with high technical and economic impacts. The Project developed by France partner was evaluated by Romania partner, in order to improve its quality and transferability. In this conditions the project facilitates the exchange of ERASMUS mobility for students and teachers.

Introduction

- A **ProjectX** is a tool used to allow teacher's individual attention to each singular student, and respect their own personal learning rhythms.
- Because a bad power quality can cause technological damage (defects and deterioration of product quality, reduced productivity, irregularity of the technological process) and Electromagnetic damage (increase in energy losses, damage to electrical equipment, disruptions in automation, communication), we have to take it into account.
- The student will have to estimate the main characteristics of the electricity network by using a power quality tool.
- **With this assessment, preventive or corrective maintenance could be done to reach the best energy efficiency.**

Project description

In the frame of **One2One** was design and promote one **ProjectX** related to the electrical power analysis.

This section describes the main theoretical and practical aspects related to the study of the electricity network and make an energy assessment.

A. Theoretical Knowledge

- Study the types of Loads and verify electrical system capacity;
- Cable choice;
- Checking the protection of electrical equipment;
- Protection of persons;
- Power factor;
- Harmonics.

B. Practice

The objective of the practice is to make an energy assessment.

- To discover the electrical blueprint with its characteristics;
- To check the protection of persons;
- To check the protection of goods;
- To prepare the audit of quantity and quality electrical energy;
- To do the energy measurement;
- To conclude about the energy assessment.

Learning outcomes of the project

To be easily integrated in VET system of different European countries, in this ProjectX were presented, besides detailed description of theoretical and practical activities, a list of knowledge, skills and competences acquired after project completion for some learning outcomes, as:

- Compare an electrical installation to the IEC international standards;**
- Assess the electric safety and availability of an electrical installation;**
- Generate an electrical audit of a 3 phase power supply.**

The tested of the ProjectX

This ProjectX was tested "One2One" by students and teachers of Electrical Engineering of University of Pitesti - Romanian partner project.

The students make an energy assessment. They are quantify energy consumption for each machine in the school laboratory. They check quality of service compliance and validate incoming power quality at the service entrance. They validated the protection device. Students have followed all the steps provided in the Guide - Practice and completed the work practice.



After an internal assessment, the conclusions of students and teachers are:

- ✓ The presentation of the project is clear for what it's contains. The short presentation of the project is good and necessary in the electricity networks to reach the best efficiency. The connection between the title and content is ensured by questions that rise the curiosity to scroll through the project.
- ✓ The theoretical knowledge is very complex, but is presented gradual, logically and very complete. The references are very good and updated material for study.
- ✓ The questions of the tests are very clear, the answers are easy to find in theory, after study.
- ✓ The practice is very clear and interesting activity.

Conclusions

- In this paper were presented a series of theoretical and practical activities useful for VET, in order to improve general knowledge about electrical power analysis.
- The project has a logical structure, a gradual introduction of elements of electrical components that takes into account its compound, protection of Compounds equipment, but also personnel protection serves. It highlights the parameters required to estimate the main characteristics of a grid.
- The project can be approached by students from vocational school. The students at UPIT encountered in their curriculum many similarities with the projects' content. By completing the project they will be able to achieve a preventive or corrective maintenance for increased energy efficiency, increased technical and economic impact.
- **The project is very complex, excellent and facilitates the exchange of ERASMUS mobility for students and teachers in a high grade of quality, in accord with the European Strategy 2020.**

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