

Teaching electric motors' starting methods in Lifelong Learning Programs

Robert BELOIU¹

¹University of Pitesti, Str. Targul din Vale Nr.1, 110040, Pitesti, Romania



ABSTRACT

In this paper is presented a way of developing and encouraging mobilities under the Lifelong Learning European Educational Programs. The article makes a review of the actual situation for mobilities in Europe and Romania. Following this presentation, it is described a method of teaching the starting methods for an induction motor developed at the University of Pitesti. This method was developed during a Leonardo da Vinci Transfer of Innovation project in partnership with other six European partners. The methodology focuses on the starting methods of the induction machine.

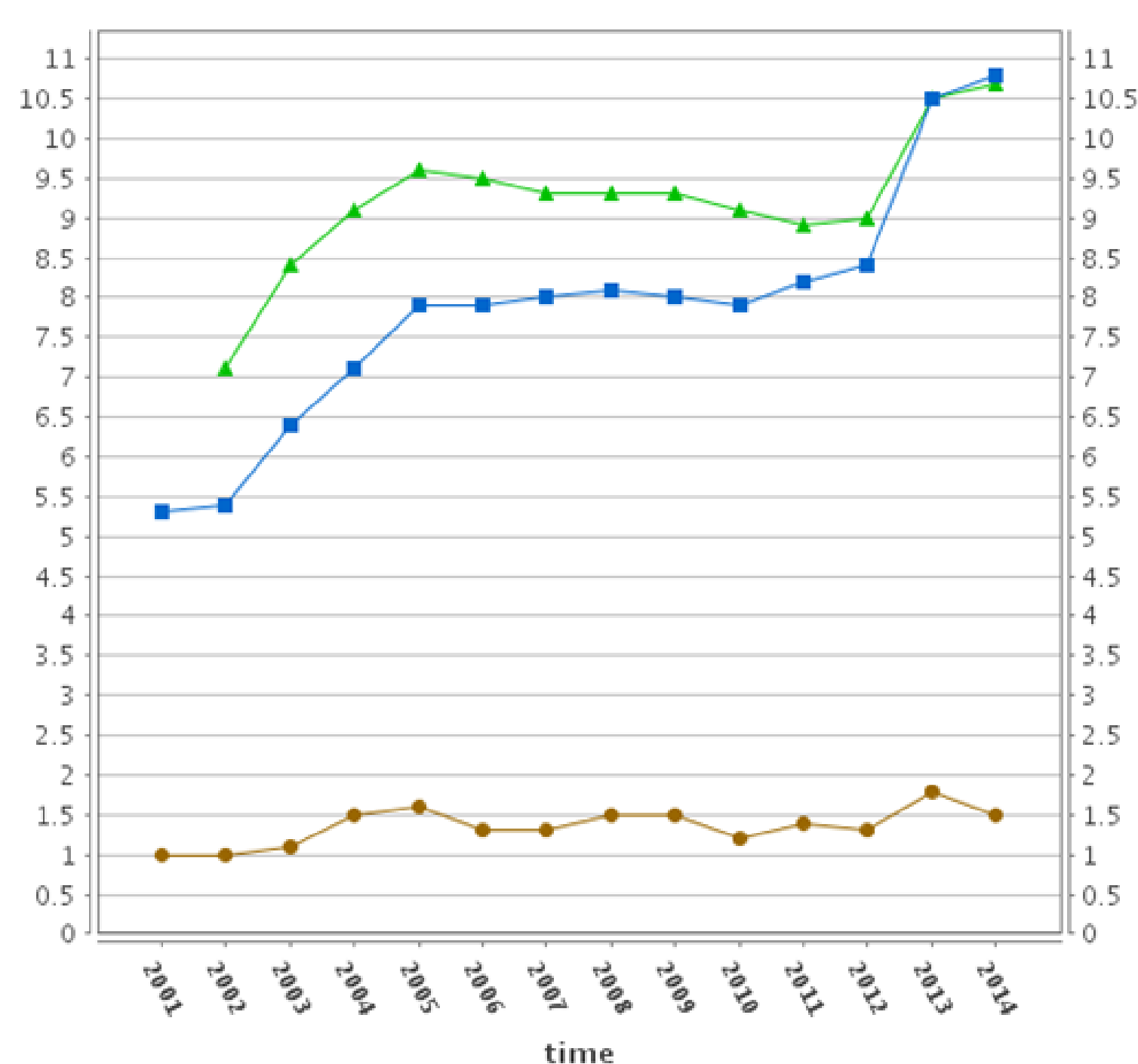
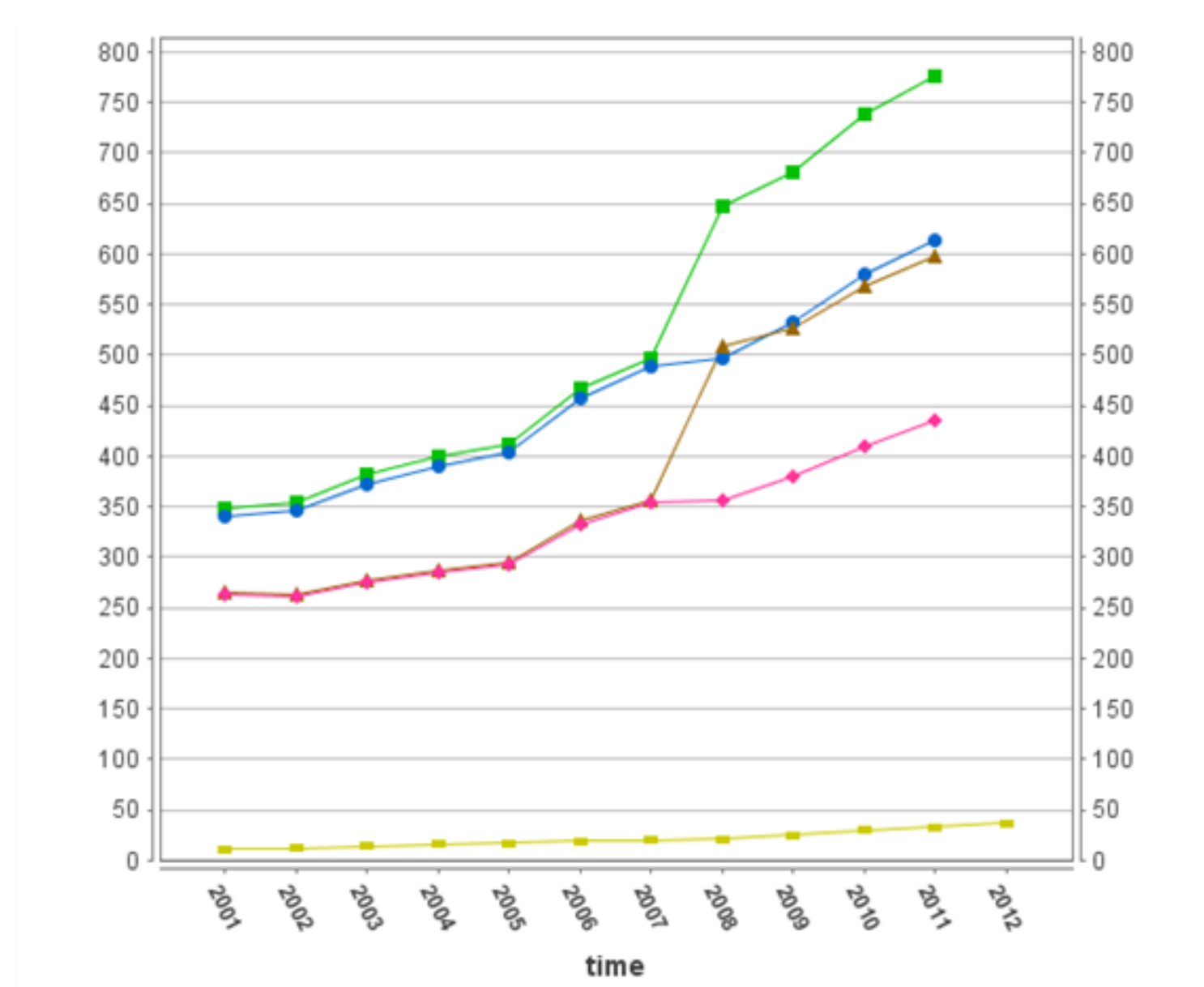
INTRODUCTION

- The internationalization affects all aspects of life: commerce, work force mobility, capital, industry, etc. Higher education makes no exception[1]. This refers to both students and teachers involved in formal and informal adult education processes.
- The participants in international educational programs are better prepared to face a globalized world and its challenges [2].
- The companies in the most developed countries and the society in general (USA, Canada, Australia, China, UK, Germany, etc.) give much credit to an international educational experience [1][3].

ROMANIA' MOBILITIES

Romania has a very low number of mobile students in tertiary education (figure 4).

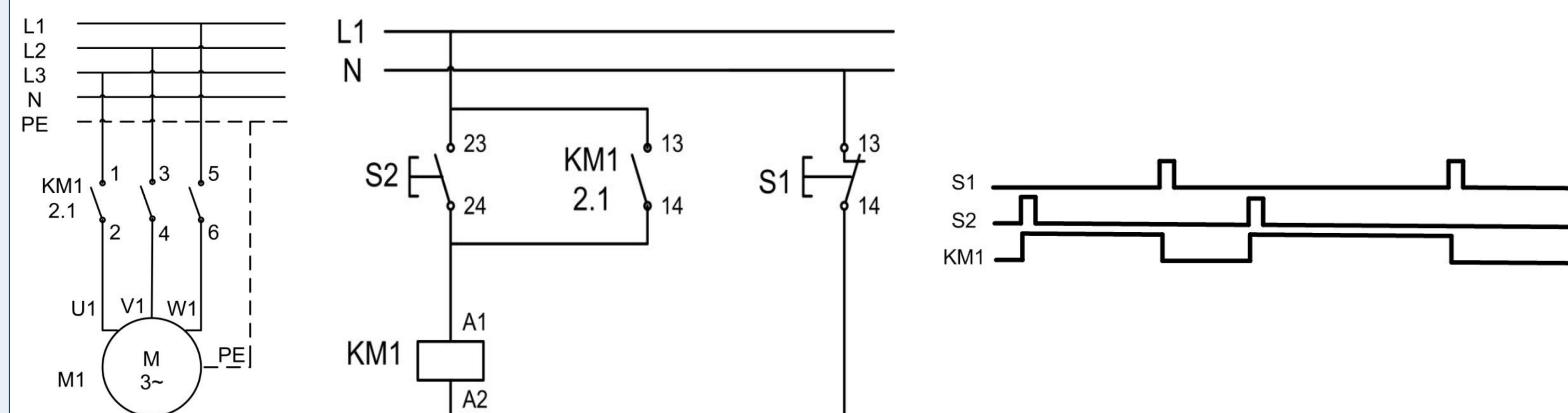
- One reason is related to financial difficulties that students taking a mobility face in a different country.
- Another reason is due to a very rigid attitude from the teachers towards results' validation and acceptance of the abroad academic results [6][7].
- Another reason for the very low percentage of mobile university students is their mentality.
- In Romania, the participation rate in this program is very low comparing to other European countries.



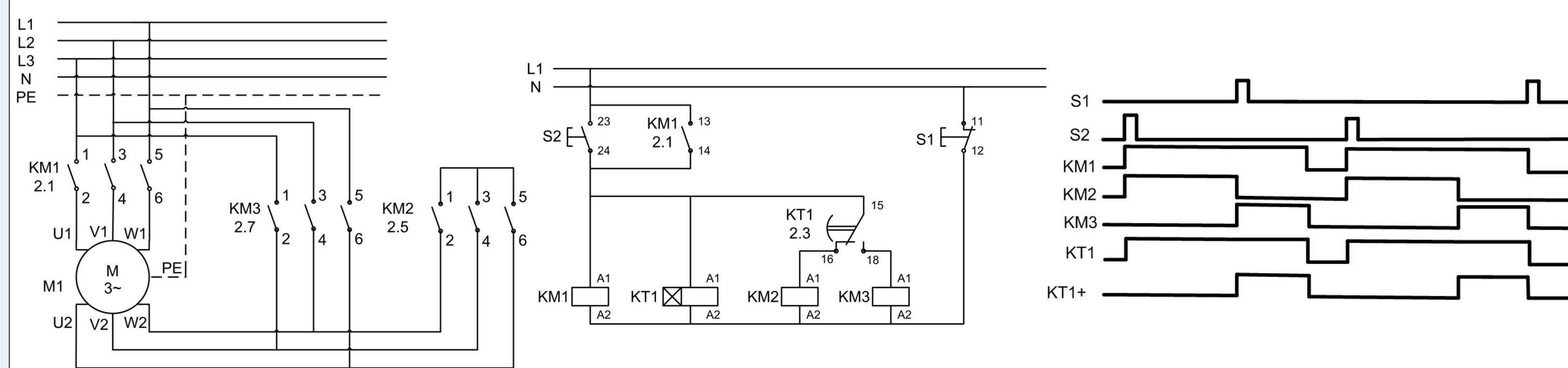
METHODOLOGY DEVELOPMENT

- The project is developed by a consortium of seven Educational Institutions from different European areas: Spain, France, Finland, UK, Romania, Turkey and Portugal.
- The main idea of the project is to develop an educational manual that allows the students to work independently of the teacher[10]. That means the teacher is only an assistant to the student while the later performs application classes.
- Using the developed methodology, the student can have a concrete idea of what he/she is going to study abroad and prepare the lessons before the mobility.

STARTING THE INDUCTION MACHINE



$$KM1 = (S2 \text{ AND } (\text{NOT } S1)) \text{ OR } (KM1 \text{ AND } (\text{NOT } S1))$$



$$KM1 = (S2 \text{ AND } (\text{NOT } S1)) \text{ OR } (KM1 \text{ AND } (\text{NOT } S1))$$

$$KM2 = (\text{NOT } KT1+) \text{ AND } ((KM1 \text{ AND } (\text{NOT } S1)) \text{ OR } (S2 \text{ AND } (\text{NOT } S1)))$$

$$KM3 = KT1+ \text{ AND } ((KM1 \text{ AND } (\text{NOT } S1)) \text{ OR } (S2 \text{ AND } (\text{NOT } S1)))$$

$$KT1 = (KM1 \text{ AND } (\text{NOT } S1)) \text{ OR } (S2 \text{ AND } (\text{NOT } S1))$$

LEARNING OUTCOMES OF THE PROJECTX

- Learning Outcome 1: Analyze the electric schematic for starting an induction machine
- Learning Outcome 2: Perform electrical installations and electrical maintenance for industrial premises
- Learning Outcome 3: Install programmable automated systems
- Learning Outcome 4: Write simple PLC program for sequential control systems

CONCLUSION

The novelty of this approach is that this material is prepared beforehand the mobility between all the partners. If the students and teachers have access to the material that is going to be used abroad, some of their fears could be solved before the actual mobility. By overcoming some of the fears, it is the hope of the authors that the number of Erasmus+ mobilities will increase to and from Romania.

Erasmus+ mobilities for both teachers and students bring many personal, professional and institutional benefits in many ways. By encouraging mobilities to and from abroad will bring improvement in the Romanian educational system

ACKNOWLEDGEMENTS

This paper is part of the project "One teacher and one student working with ProjectX", project code 2013-1-ES1-LEO01-66485, acronym "One2one", funded with support from the European Commission, through Leonardo da Vinci, Transfer of Innovation program.

DISCLAIMER

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

REFERENCES

- One2one - One teacher and one student working with ProjectX, <http://projectxone2one.eu/>, accessed May 2015 .
- I. Bostan, R. Beloiu, and N. Bizon, "Learning Digital Frequency Dividers Through Practical Laboratory Activities," *Procedia - Soc. Behav. Sci.*, vol. 180, pp. 1014-1021, May 2015.
- B.-A. Enache, L.-M. Constantinuescu, and E. Lefter, "Modeling aspects of an electric starter system for an internal combustion engine," 2014, pp. 39-42.
- M. Iorgulescu and C. Savulescu, "Aspects of learning techniques in power system," 2013, pp. 1-4.
- R. Beloiu, "Teaching Induction Machine Laboratory Using ProjectX," *Procedia - Soc. Behav. Sci.*, vol. 182, pp. 349-359, May 2015.
- One2one - One teacher and one student working with ProjectX. Catalogue of ProjectX, in press, accessed May 2015 .

CONTACT INFORMATION

University of Pitesti - Faculty of Computers, Electronics and Electrical Engineering, www.upit.ro
robertbeloiu@gmail.com; robertbeloiu@yahoo.com; robert.beloiu@upit.ro