

# Modern Education Techniques in Electronic Packaging based on “E-Learning Education and Continuing Training to Electronics Assembling Technology (ELECT2EAT) European Project”

Norocel-Dragos Codreanu<sup>1</sup>, Zsolt Illyefalvi-Vitéz<sup>2</sup>, Paul Svasta<sup>1</sup>, Alena Pietrikova<sup>3</sup>

1. Politehnica University of Bucharest, Center for Technological Electronics and Interconnection Techniques, Splaiul Independentei 313, 060042-Bucharest, Romania, <norocel.codreanu|paul.svasta>@cetti.ro

2. Budapest University of Technology and Economics, Department of Electronics Technology, Goldman t. 3, Budapest, H-1111, Hungary, illye@ett.bme.hu

3. Technical University of Kosice, Department of Technologies in Electronics, Alena.Pietrikova@tuke.sk

## ABSTRACT

*The objective of the paper is to emphasize the main goal of ELECT2EAT project, which is to adapt and integrate the innovative content and results already existing at some universities of Central East European region acquired partly from previous Leonardo da Vinci Projects and partly from other innovative projects into a public, multi-linguistic training system. Organizations providing life long learning opportunities in the region are interested to use of the innovative e-learning courses and web-based virtual training tools for regular training. Teachers of vocational education schools, associations, enterprises working in the electronics assembling field, bodies providing guidance and counseling services relating to life long learning can make also good use of virtual training facilities.*

## 1. INTRODUCTION

The rapid development of micro-electronics devices and associated assembling technologies is accompanied by the dramatic change of the knowledge required from all technical personnel involved in this field, causing a contradiction between the high number of unemployment people and the high number of working places offered by the electronics assembling companies.

Teachers of vocational education schools, associations, enterprises working in the electronics assembling field, bodies providing counseling services relating to life long learning can make good use of virtual training facilities.

There are three kinds of partners in the proposed project: providers (universities), who will update, transfer, integrate and adapt their innovative training content to an e-learning system, including a virtual factory, meeting the identified national and regional requirements, receivers (training centers, industrial associations and parks), who will identify and analyze targeted user requirements, select the innovative content to meet these requirements and make the training system feasible, and consultants (skilled pedagogic knowledge centres), who are requested to advise advanced methods and control the process of transfer.

The most important tangible outcomes will be that the training centers, industrial associations and parks, who participated as partners in the project, will be able to provide the self-learning web-based courses for all people of the region who are seeking for jobs in this field or are interested in continuing or convergence education for any other reasons [2].

As intangible outcomes the improvement of the quality and attractiveness of the knowledge and skill of the employees of these regions in the European work-force market should be mentioned. It is believed and by the university education it has been proved that the web-based

training systems have a short-term impact on both convergence education and continuing.

## 2. MODERN EDUCATION TECHNIQUES IN ELECT2EAT PROJECT

The Modern Education Techniques (MEC) can be defines as a system controlled practice that makes possible to concentrate on special teaching behaviour and to practice teaching under controlled conditions. MEC is a teacher education technique which allows teachers to apply clearly defined teaching skills carefully prepared lessons in a planned series of encounter with a student/small group. MEC can be considered also as a teacher training programme which reduces the teaching situation or makes it personalized teaching situation to a simpler and more controlled encounter achieved by limiting the practice teaching to a Specific skill and reducing time and class size.

The E-learning procedures in ELECT2EAT simplify the complexities of the regular teaching process. In modern education procedure the trainee is engaged in a scaled down teaching situation the practicing and mastering of specific teaching skill such as lecturing, questioning and mastering specific teaching skill such as lecturing, questioning or leading a discussion, mastering of specific teaching strategies, flexibility, instructional decision making, alternations uses of specific curricula, instructional materials and class room management [1], [3].

A learner can easily navigate through the slides by using the buttons in the lower left corner of each slide. The main point of the method is that the concise slides of the tutorial course provide a guide for the access to the database. The second group of the buttons of each slide (figure 1) guides and helps the learner to explore all the knowledge of the system by the use of its well-structured system of hyperlinks [6].



**Figure 1 The buttons of slides help the access to the database**

In order to present some details, below are two example from the microelectronics and packaging area, where the systematic application of knowledge to practical tasks has of very high importance.

In the first example of an instructional course we would like to demonstrate how the performance-centered learning tool helps to transform knowledge into performance by

creating an interface to the knowledge base. The course has a linear tutorial part of slides in html format (figure 2). We do not use figure captions for these slides, since each slide has title in its heading, and a number in its lower right corner. The slides cover only the most important issues and offer a quick access to the larger database [6].

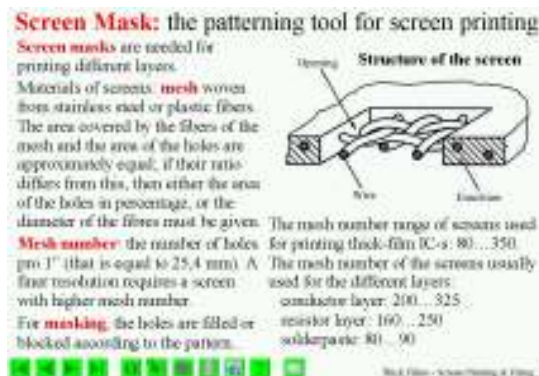


Figure 2 Example of a slide and its access to database

The second example is focused to the PCB design, task based, multimedia course, which provides the students with a systematic presentation of high performance printed circuit/wiring board (PCB/PWB) design and complex characterization of PCB structures and offers, based on numerous figures, formulas and examples, a practical approach on design of printed circuits [3].

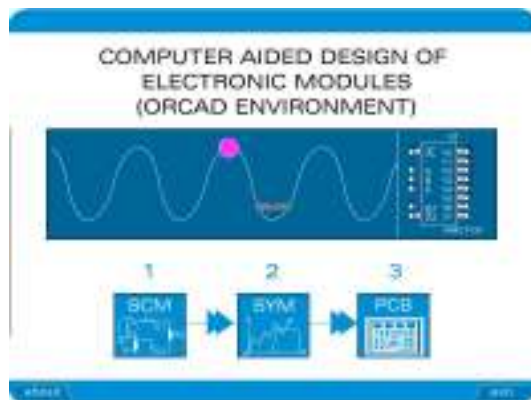


Figure 3 Flash presentation that emphasize the basic design flow of a PCB electronic module

The objectives of this course are the following: 1) Understanding main topics of printed circuit/wiring board (PCB/PWB) design; 2) Understanding the CAD design flow for PCB electronic modules development; 3) Understanding the principles of analog and digital PCB designs; 4) Understanding advanced topics in PCB design based on electromagnetic compatibility, signal integrity, and related issues; 5) Understanding PCB post-processing and the interface designer - manufacturer.

The structure of the website, which hosts all the courses, includes: 1) comprehensive navigation system that will allow a clear and concise structure. It has to present data in an easy to read format and allow for students to choose their own path in studying a certain chapter; 2) Theoretical tutorials that are be listed in gradual steps; 3) Audio/video demonstrations and workshops to present a practical view and complement the theoretical knowledge; 4) Help section to ensure easy access to all areas; 5) Glossary linked to each

course to explain the term presented in that particular section; 6) General information on the course, the professor and contact information.

At the end of each course module, after passing the tutorials, a series of tests were implemented, in order to check the level of knowledge. Additionally, in order to solve practical projects (tasks), various hands-on tutorials show the practical implementation of projects having as purpose the development of electronic modules/assemblies.

Finally, it is important to say that MEC can be altered to suit many circumstances and training levels, being flexible and trainee centred in all the cases.

### 3. CONCLUSIONS

The Internet has broken all the previous boundaries, offering today a high-quality environment for e-, distance and web-based-learning, with good results also in electronics engineering education.

Because selecting the right information out of the continuous flood coming from many sources is a daunting task for a trainee learning the basics, the ELECT2EAT project, the implemented virtual factory and specialized courses can be the necessary helping hand for learning electronic packaging.

Working close together on the specifications of the website and defining the elements that will come together in building the learning system, the European system offers right now a practical solution that offer not only great maintainability from the professors viewpoint but also a large area of engineering information that can keep an interested learner in front of the his computer for a long time.

One of the main goals of the ELECT2EAT project is to make this solution a practical one that can be used without the help of a web developer, and without interventions, not only for the packaging courses but also for any other type of engineering course that requires interaction with students and trainees.

The most important impact of the application of the e-learning system will be on the living standard and general happiness of the people, who will be able to acquire a good knowledge, high skill and strong courage to apply for and obtain good jobs in electronics industry [4], [5].

### REFERENCES

- [1] [www.ipci-project.com](http://www.ipci-project.com), <http://www.ett.bme.hu/vlab>, <http://www.sensedu.com/>, <http://www.ett.bme.hu/memsedu>
- [2] B. Hall, "Web-Based Training Cookbook", John Wilwy & Sons Inc., 1997
- [3] Norocel-Dragos Codreanu, Zsolt Illyefalvi-Vitéz, Paul Svasta, "E-learning in Electronic Packaging based on the IPCI European Project", 17th EAEEIE Conference, Craiova, Romania, June 2-3, 2006, pp. 296-302.
- [4] Bates, T. (1990): "The Challenge of Technology for European Distance Education." In: Bates, A. W. (ed.): Media and Technology in European Distance Education. Pp. 17-26. Heerlen: EADTU.
- [5] Cooper, Alan: "The Inmates are running the asylum" SAMS, a div. of Macmillan Computer Publishing, 1999, pages 124-128.
- [6] Tzanova S., Schaeffer C., Royer M., Illyefalvi-Vitez Z, Mouthaan Ton, "Internet-based eLearning System for Performance Centred Instruction in Microelectronics", IPS-2005, Cambridge, USA, 07-10.07.2005, pp. 36-42.