Application of the Information and Communication Technologies in the Centre for Science and Education “Ecology in Power Engineering”

Authors:
Irina Putilova, Centre for Science and Education “Ecology in Power Engineering”, MPEI
Marina Zhokhova, Dept. of Theoretical Fundamentals of Electrical Engineering, MPEI
Mikhail Shurkov, Information Computer Centre, MPEI
Anna Gorbunova, Information Computer Centre, MPEI

Speaker:
Irina Putilova
Moscow Power Engineering Institute
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A. Introduction

B. Brief information about vocational education in the energy sector

C. Features of activity of the Centre for Science and Education “Ecology in Power Engineering”

D. ICT elements, used in the training programs of the Centre

E. Information System “The Best Available and Perspective Nature Protection Technologies in the Russian Power Industry”
Increasing the role of vocational education

Increasing amount of information

Reorganisation of higher education

Development of the energy sector
Vocational education

• private educational institutions
• internal training centers
• external commercial training centers
• state educational institutions
• autonomous educational institutions
Briefly about the Centre “Ecology in Power Engineering”

- Established in 1997
- MPEI department
- Aim of creation:
  - Removal of nonconformity of personnel qualification working at power companies to the constantly changing nature protection requirements.
Features of the Centre

Wide range of the training programs (18…1034 academic hours)

Regular update of the ongoing programs and development of the new ones

Development and update of the teaching aids

Conducting classes in the specialized laboratories of MPEI, Information Computer Centre and MPEI TPP

Application of ICT

Practical relevance of all diploma thesis works
Results of activity

1500+ employees trained

Dozens of the programs developed, updates and realised

Dozens of the teaching aids developed and updated

National Environmental Award 2007 in the category “Education for sustainable development” as a member of MPEI team
Realised training programs for the following categories

- Chief engineers of thermal power plants;
- Deputy chief engineers of TPPs for repair;
- Deputy chief engineers of TPPs for operation;
- Station shift supervisors of TPPs;
- Shift supervisors of boiler-turbine equipment of TPPs;
- Shift supervisors of electrical equipment of TPPs;
- Heads of thermal engineering services of TPPs;
- Heads of automation and control services of TPPs;
- Heads of fuel and transport services of TPPs;
- Heads of metal laboratories of TPPs;
- Heads of chemical laboratories and chemical services of TPPs;
- Engineers and technicians of enterprises in the field of environmental technologies in the energy sector;
- Engineers and technicians of enterprises in the field of economics and management in the energy sector;
- Engineers and technicians of enterprises in the field of hazardous waste management;
- Engineers and technicians, getting training under the program “Construction, reconstruction and overhaul of external electrical networks. Installation, assembling and commissioning”;
- Production and repair planning. Carrying out repairs and maintenance, etc.
Retraining programs

- Thermal power plants
- Power stations
- Electric power systems and networks
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ICT tools

- **educational**
  - report knowledge, form practical skills and abilities, providing necessary level of achievement

- **simulators**
  - mean for drilling various kinds of skills and abilities, repetition or consolidation of the material learnt

- **information-retrieval and informative**
  - report knowledge, form skills and abilities for information arrangement

- **demonstrative**
  - visualize the studied objects, phenomena and processes for their exploration and research

- **simulation**
  - represent the certain aspect of reality for learning its structured and functional characteristics

- **laboratory**
  - provide conducting possible remote experiments using real equipment

- **modeling**
  - provide modelling objects, phenomena and processes for their exploration and research

- **calculation**
  - computerize varying maths and other routine manipulations

- **educational games**
  - meant for creation practicing situations, in which the trainees’ activity is realized in the game
Some ICT tools applied at the Centre

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Interactive workbooks with built-in Virtual tools

Example 7. Determine the readings of ammeters if the phase voltage of the source \( U_{ph}=220 \) V, \( R=\frac{L_{c}}{I_{c}}=5 \) Ohm. Build a vector diagram.

Solution:

- Determine the readings of ammeters if the phase voltage of the source \( U_{ph}=220 \) V, \( R=\frac{L_{c}}{I_{c}}=5 \) Ohm.
- Build a vector diagram.

Vector diagram:

- \( U_{a}=4 \) A
- \( I_{b}=4 \) A
- \( I_{c}=4 \) A
- \( I_{d}=4 \) A
- \( I_{e}=4 \) A
- \( I_{f}=4 \) A
- \( U_{g}=0 \)
Virtual instruments
Data Base “The Best Available and Perspective Nature Protection Technologies in the Russian Power Industry”

Registered in 2013 as a Data Base
Copyright holder - MPEI
Authors: Putilov V.Y. and Putilova I.V.
Web: http://osi.ecopower.ru
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About the information system

The Information system “The Best Available and Perspective Nature Protection Technologies in the Russian Power Industry” (hereinafter the System) contains the materials covering all the main aspects of the nature protection activity in power engineering.

The main objective of the System is information support of the nature protection activity in power sector for the following:

- Implementation of ecologically and economically effective nature protection policy;
- Training, improvement of professional skill and professional retraining of experts from power companies in high schools and other educational institutions according to the state-of-the-art requirements in the field of protection of environment from the man-made impact of the power objects.

Sources of information are as follows:

- Results of the system researches on various aspects of ecological problems in power engineering, represented by the authors to the Editorial Board of the system;
- Proceedings of international and Russian workshops and conferences on ecology in power engineering;
- Expert analytic materials on different directions of the nature protection activity.
The System opportunities

- free access of students and trainees, pupils and other groups of users interested in the nature protection problems
- open information exchange on ecology in power engineering between the Russian and foreign experts
- online acquaintance of any Russian or foreign user with the updated information on development, introduction and use of nature protection equipment and technologies
- formation of a favorable image of Russia in the field of environmental protection
Conclusion

With ICT development, completely new requirements are set for the syllabus, teachers and trainees. The more diverse the choice of ICT tools, the more effective is the process of mastering knowledge, and the interest of trainees is more vivid and sustainable.
Thank you for your attention!

Irina Putilova
Centre for Science and Education “Ecology in Power Engineering”, MPEI
PutilovaIV@mpei.ru
www.ecopower.ru