Training of professionals

The "Training of Professionals" program was planned to develop the knowledge of design engineers and lighting experts about efficient technologies. By training the engineers ELI-Hungary expects that **they will more often apply efficient lighting solutions in their design practice**.

While engineers may not be involved in smaller lighting projects, in the case of major lighting projects, the involvement of lighting engineers is unavoidable. An engineer is hired, who designs the new equipment according to the owners' expectations. Energy efficiency or minimization of lifetime costs is rarely included in the scope of expectations. Illumination levels and investment costs have high priorities. The specification of luminaries, for example, is largely influenced by the individual design engineer's background.

Only engineers with a so-called "0.4 kV license" are supposed to work on major lighting projects. There are ca. 500 engineers, who own such a license. It can be supposed that most of them have never received regular lighting education. They learned by experience, and obviously, many of them have gained good knowledge of energy efficiency lighting. It is supposed that 3-400 engineers lack this knowledge and 100-200 of them will participate in the ELI training. The target group will be extended by architects (interior designers), and heads of technical departments at local governments, hospitals, universities, etc.

Bigger projects of the public sector may only be implemented through public procurement processes. In these cases much depends on the specification i.e. the tender document. If efficiency expectations are not properly set by the document or efficiency is not included as an evaluation criterion, the bidders will offer the cheapest possible solutions. The cheap solutions are usually not the efficient ones.

By the help of the training program ELI-Hungary

- improved the availability of expertise on the market (project owners can more easily hire educated engineers),
- improved the knowledge of practicing design engineers (this way they will more often opt for efficient solutions),
- generated a workforce that is keen to assist development of lighting projects.

The training was organized by the Lighting Society of MEE, the Hungarian Electrotechnical Association. The training itself took the form of distant learning. The trainees were invited only two times to meet the lecturers. Between the regionally organized kick-off and closing meetings the trainees used the training materials (printed materials and CDs). For all the duration of the training consultancy by reputed tutors was available for the participants.

The professional training was held between September 24 and November 22, 2001.The courses were held in 4 different settlements all over Hungary. The number of attendees reached 159, out of which 135 received an ELI certificate.

The scope of professionals included:

- design engineers who have an important influence on design and specification of lighting equipment
- technical/energy managers of major municipalities or industrial facilities who have influence on upgrade projects
- operational engineers who are responsible for the operation and maintenance of large indoor lighting systems
- staff members of major installation and contracting companies working in the lighting field.

The curriculum of the training (as well as the textbook distributed for trainees) covered the following topics:

1. Introduction: technologies for energy efficient lighting

2. Lamps

2.1 Incandescent lamps
2.2 Fluorescent lamps, compact fluorescent lamps
2.3 High pressure discharge lamps

3. Lamp control gears

3.1 Inductive ballasts
3.2 Electronic ballasts
3.3 Starters
3.4 Ignitors

4. Luminaires

4.1 Intensity distribution
4.2 Luminance distribution
4.3 Utilisation factors
4.4 Protection (IP numbers, classes)

5. Planning efficient lighting

5.1 Efficiency method
5.2 Average illuminance
5.3 Average luminance
5.4 Direct/indirect ratio
5.5 Point-by-point method
5.6 Continuous row of luminaires
5.7 Glare
5.8 Direct glare
5.9 Indirect glare
5.10 CAD calculations
5.11 Daylighting and artifical lighting

6. Electrical calculations and installation

- 6.1 Parallel compensation
- 6.2 Series compensation
- 6.3 Voltage drop
- 6.4 Dimming of light sources
- 6.5 Installation of lighting systems

7. Good maintenance for efficient and environmentally friendly operation

- 7.1 Contamination of luminaires
- 7.2 Group replacement vs. individual replacement
- 7.3 Disposal of dangerous waste

8. Special cases

- 8.1 Offices
- 8.2 Classrooms
- 8.3 Industrial halls

9. Economical aspects

- 9.1 Investment costs
- 9.2 Energy saving
- 9.3 Evaluation of energy efficiency upgrade interventions

Part B: Glossary with explanation of lighting terms (information CD)