



European
Commission

MICROGUIDE

Project acronym:
Microguide

Project full title: DEVELOPING GUIDELINES
FOR THE IMPLEMENTATION OF
MICRO-CREDENTIALS IN HIGHER EDUCATION

Project No. 2021-1-ProjectRS01-KA220-HED-000027585

Funding Scheme: Erasmus+



PILOT MICRO-CREDENTIAL 1 – SERBIA

Name of the micro-credential:

The elevator expert

Provider

University of Belgrade, Faculty of Mechanical Engineering, Belgrade, Serbia

Programme level:

Suitable for students of higher education, bachelor or master studies in mechanical engineering.

Link to the EQF:

Level EQF-6, equivalent to MECES-2

Duration:

120 h

Modality:

100% face-to-face

ECTS:

12

Justification

There are over 25,000 lifts in residential buildings in Serbia, of which as many as 15,000 urgently need replacement, requiring around €450 million, according to data collected by the Chamber of Commerce of Serbia. Half of these lifts are located in Belgrade, the capital of Serbia. In Belgrade alone, approximately 7,000 lifts are due for complete replacement. A significant issue is their age, with lifts in the country averaging 44 years old, even though the typical service life of a lift is 25 years. Additionally, there is a shortage of professional staff, as Serbia lacks sufficient servicemen, lift installers, and engineers specialised in lift systems. Many of those currently working in the profession are nearing retirement, with a shortage of younger workers entering the field. It is a specialised area requiring knowledge of mechanics, mechanical engineering, electrical engineering, and automation. In Belgrade, 1.6 million people use lifts daily, which exceeds the capacity of public transport vehicles.

Technical legislation in the field of lifts is aligned with EU regulations through the adoption of technical requirements for placing new lifts on the market, as well as for lifts already in use. The construction of multi-storey buildings is on the rise, and these increasingly feature more modern and technically complex lifts. Given these developments, there is a need for more precise regulation in this area to enable easier and more efficient monitoring of all activities and improve connectivity and communication between business and educational entities in the field. Unfortunately, there is no data regarding lift maintenance professionals' numbers, qualifications, or personnel structure.

According to available data, the current age structure of personnel/engineers holding BSc or MSc degrees is 50-60 with BSc and 60+ with MSc, having more than 20 years of working experience in the lift industry and related jobs.

Following the collected data from the Serbian Business Register Agency, 186 business entities in the lift sector were identified, of which 117 entrepreneurs and 69 companies, mostly limited liability companies.

Based on the collected data, it can be concluded that the field of lift installation and maintenance is highly relevant, with increasingly complex demands placed on all economic entities involved in the installation and upkeep of lifts. An analysis of the current situation regarding the number of businesses engaged in placing lifts on the Serbian market, inspecting lifts, and maintaining those in use reveals a need for further improvement of all activities in this area, including through:

- Increase in the number of employees considering the increase in the number of lifts,
- Employment of young people to transfer knowledge as soon and as successfully as possible,
- Organization of training and professional workshops,
- Acquaintance with the content of regulations and standards,
- Organizing knowledge tests.

The objective of the training

The purpose of the micro-credential is to acquaint participants with the basic principles of lift operation, their classification, the main parts of lifts (shaft, guide rails, cabin frame, cabin, counterweight, lift drive, ropes, safety components, control systems) and corresponding EN standards, technical drawings in lift design, technical documentation, maintenance, occupational health and safety and correspondingly basic terms in foreign languages (especially English).

Learning Outcomes

Upon successful completion of the micro-credential, the participant will:

- Be familiar with existing types of lifts, and also be aware of definitions and

symbols used in the analysis and design of lifts; explain the different principles of lift operation.

- Be familiar with specifications and design practices adopted by various manufacturers for lifts, including corresponding data, figures and graphs, particularly related to current design practices in Serbia. Explain the difference between an electric and a hydraulic lift; list and distinguish the basic parts of the lift and its safety components; Understand the elements of the technical drawing of lifts; distinguish the basic elements of the lift on the technical drawing; and understand the meaning of the basic abbreviations on the technical drawing.
- Be informed about technical regulations and legislation, including valid standards for lifts, EU Machinery directives, corresponding by-laws and safety regulations. Be familiar with the issues of occupational health and safety.
- Understands and uses terminology in English

Access and admission

This micro-credential is suitable for students in a higher-level training cycle, university degree, or university master's degree in mechanical engineering.

Curriculum structure

Content of theoretical education (45 hours)

- Introduction (from history to contemporary trends)
- Principle of lift operation
- Classification of lifts
- Basic parts (lift shaft, rail guides, cabin frame, cabin, counterweight, lift drive, supporting means, safety components, control)
- Specifications for the design of lifts
- Belt and rope drives
- Design analysis of lift elements and components
- Lift travel analysis
- Environmentally friendly lifts
- Principles of lift traffic design
- Technical drawing (base, section)
- Basic principles of visual presentation in lift construction (how to present lifts and components)
- Basic abbreviations
- Construction book
- Technical documentation (assembly drawing, electrical diagrams, assembly instructions)
- Internal documentation

- Fundamentals of lift maintenance
- Basic safety rules
- Safety at the construction site (protection of the work area, shafts)
- EU Machinery directive
- EN and other relevant standards for lifts
- National regulations for lifts
- Basic professional terms in English (Glossary of Lift Terms)

Content of practical education (65 hours)

- Video presentations of constructions and principles of operation of lifts
- Examples for calculation of elements of lifting mechanism and superstructure
- Application in lift design of software for 2D drawings and 3D modelling
- Laboratory exercise on the computer, 2D drawings and 3D modelling of elements of lifts
- Presentations by professionals in the lift industry in companies (showrooms, design offices, production plant).

Evaluation methodology

The syllabus is developed with master classes where the teacher explains the theoretical concepts and practical activities.

The evaluation is done by delivering documents showing evidence that the practical activities have been carried out correctly. In addition, it will also be necessary to include texts that demonstrate that the concepts worked on in each activity have been understood.

Teaching staff

The teaching staff must have expertise in the following areas:

- Mechanical engineering, material handling and conveying machines, vertical transportation
- Technical legislation and directives on machine safety, technical regulations on lifts, valid EN standards for lifts
- English terminology regarding lifts
- Proficiency in 2D drawings and 3D modelling

Material resources

This micro-credential needs a classroom that has:

- Tablu;
- Projector
- One computer for each student. The student will need administration permissions to enable him/her to use corresponding software for practical activities.
- Internet connection