



## Active Learning Community for Upskilling Technicians and Engineers

NEWSLETTER

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### CURRICULUM for Upskilling Technicians and Engineers in the Sector of Machine Building and Mechatronics

#### COURSES

The Curriculum is based on the findings of a survey carried out among 161 companies in the above sector covering the following European regions: Gabrovo, Plovdiv, Bulgaria, East Macedonia and Thrace, Greece, Pomorskie, Poland, Nis, Serbia.

It consists of two parts. The first one includes 8 courses tailor-made for the learning needs of technicians in the sector of Machine Building and Mechatronics which are

#### Electricity

#### Electrical Drives

#### Pneumatics and electro-pneumatics

#### Hydraulics

#### Vacuum and vacuum technology

#### Optimal use of compressed air

#### Operating CNC Machines

#### Operating automated production system

and 6 courses for engineers

#### Basic schemes in automated pneumatic systems

#### Energy efficiency in pneumatic systems

#### Hydraulics, proportional hydraulics

#### Electrical engines and complex electrical drives

#### Automated manufacturing systems

#### Quality assurance, quality control and testing

The Curriculum provides information on each course duration which varies between 3 and 5 days, number of academic hours divided between theory and practice by practice outweighing the theory, a short course overview and learning outcomes expected to be acquired by the learners after completing the course. Both topics to be taught and industry-related problems to be solved are presented in a tabular form. Required resources (e.g. equipment, materials, tools, software, etc.) necessary for carrying out the learning sessions and recommended reading resources are included as well.

#### TEACHING METHODOLOGY

The teaching methodology applied in the Curriculum is blended learning, where ICT is more strategically used. The e-learning part is based on open educational resources - self-study of both theory so that the learners could be prepared in advance for their traditional classroom classes and practice so that the learners could be better prepared for their

jobs through learning by doing in real-life industrial settings.

The traditional classroom part is based on active learning techniques (learner-centred) such as flipped classroom, jigsaw, problem- and project-based learning, think-pair-share, etc., where the learners are able to shape their own learning path by the guidance of a VET teacher. Studying the materials in advance, the learners discuss them in the classroom and solve problems on the basis of what they have already learnt thus improving their critical, analytical and creative thinking, motivation, communication, problem-solving, digital skills, etc. Moreover, they receive peer support and teach each other. The VET teacher is a moderator rather than an instructor and the learners are actively involved in the learning process rather than being passive viewers.

The proposed teaching methodology reflects world-wide state-of-the-art teaching techniques.



## ASSESSMENT METHODOLOGY

Taking into consideration the course duration and the type and range of knowledge and skills to be acquired, the assessment methodology of the Curriculum is based on 3 assessment techniques:

### Reflection by introducing One Minute Paper

At the end of the day's lesson learners answer teacher-posed questions (one minute paper) which prompt them to reflect on the day's lesson.

By implementing this assessment technique, the teacher gets useful feedback on how each learner progresses and what difficulties he / she faces, on the one hand, and learners develop their transversal skills to reflect on, analyze, and self-evaluate their performance, on the other hand.

### Observation by introducing Performance Checklist

At the end of day's lesson the teacher completes the Performance Checklist that states specific criteria and allows teachers to gather information and to make judgements about what learners know and can do in relation to the learning outcomes set. Furthermore, it offers systematic ways of collecting data about specific behaviours, knowledge and skills.

### Small-scale project

After completing the course, learners should develop in pairs a small-scale project in a form of a PowerPoint presentation. By working on a small project, learners have the opportunity to show to what extent they have improved their technical expertise, to develop transversal skills, such as team work, communication, problem solving, critical thinking, etc. Last but not least they can also enhance their digital competence.

Where a small-scale project is not suitable, tests could be used to assess learners' knowledge and skills.

## TEACHER'S TOOLKIT

The Teacher's ToolKit available as a PowerPoint presentation is an essential part of the curriculum and gives a brief overview of the advantages of the active learning techniques over the traditional ones, describes the potential challenges the teachers might face when applying them.

Furthermore, it provides a basic but detailed insight into six active learning techniques: flipped classroom, jigsaw, think-pair-share, brainstorming, problem solving and small-scale project.

The implementation of each technique is presented step by step thus facilitating the teachers to integrate it into their teaching process.

Last but not least the ToolKit focuses on explaining the key differences between problem-based learning and project-based learning. Combining both techniques or switching between them can make teaching and learning even more effective and meaningful.

