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Cobots VETMed

D2.2 CobotsVETMed MOOC Content Published on Smart Step eLearning Platform

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Abstract	This deliverable presents the development of the CobotsVETMed training materials and the designated online space, the Smart Step eLearning platform, where the content has been uploaded to ensure ease of access and long-term sustainability.
Keywords	Massive open online course (MOOC), Collaborative robots (Cobots), Training Programme

Document Revision History

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DISSEMINATION LEVEL		
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SEN	Classified, information as referred to in Commission Decision 2001/844/EC	
CLASSIFIED R-EU / EU-R	EU RESTRICTED under the Commission Decision No2015/ 444	
CLASSIFIED C-UE / EU-C	EU CONFIDENTIAL under the Commission Decision No2015/ 444	
CLASSIFIED S-UE / EU-S	EU SECRET under the Commission Decision No2015/ 444	

*** R:** Document, report (excluding the periodic and final reports)
DEM: Demonstrator, pilot, prototype, plan designs
DEC: Websites, patents filing, press & media actions, videos, etc.
DATA: Data sets, microdata, etc.
DMP: Data management plan
ETHICS: Deliverables related to ethics issues
SECURITY: Deliverables related to security issues
OTHER: Software, technical diagram, etc.

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EXECUTIVE SUMMARY

CobotsVETMed provides students in Tunisia and Algeria with a strategic advantage by equipping them with Industry 4.0 skills, through the integration of collaborative robots (cobots) into vocational training, allowing them to bypass outdated industrial models.

The MOOC is designed to equip learners with practical collaborative-robotics skills, combining virtual hands-on training, theory, and assessment. Hosted free of charge on AREA's multilingual Smart Step platform, it will remain open to learners and SMEs well beyond the project's lifetime. Aligned with the European Commission's drive to digitalise TVET, it is GDPR-compliant and released as an open-source resource for wider reuse.

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ABBREVIATIONS

CNC	Computer Numerical Control
Cobots	Collaborative robots
EU	European Union
ENP	Ecole Nationale Polytechnique
EQF	European Qualification Framework
GDPR	General Data Protection Regulation
ISSIG	Higher Institute of Industrial Systems of Gabes
MOOC	Massive Open Online Course
PLC	Programmable Logic Controller
SME's	Small Medium Enterprises
TVET	Technical Vocational Education and Training
UR3e	Universal Robots 3kg e- Series

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1. MOOC DEVELOPED

The CobotsVETMed MOOC is a comprehensive online training programme designed around a student-centred approach that supports the integration of future technologies into official curricula. Developed under Task T2.2, it represents an important milestone, as it initiates a series of cascade events, including the piloting and implementation of the virtual environments, the MOOC onboarding, and the Train the Trainers sessions for Tunisia and Algeria. The MOOC sets out the learning objectives that students in the target group need to attain in order to develop a skills set in collaborative robots. Its modules and units have been structured to provide a comprehensive methodology for working with and manipulating cobot environments. The design comprises:

- Virtual "Hands-on Training"
- Theoretical Framework
- Assessment and Evaluation

The 2023 EU-Tunisia Memorandum of Understanding prioritises, among other areas, "Digital transition to cooperate in the digital sector, taking advantage of all available opportunities for collaboration, including capacity building, technological cooperation, financing and joint projects." This priority is particularly pertinent to Industry 4.0, which relies on advancing digitalisation and enables companies to regain competitiveness through the integration of technology and innovation.

Against this backdrop, and in order to maximise impact and awareness, a strategic dissemination and scalability approach has been adopted, in line with the European Commission's efforts to digitalise Technical and Vocational Education and Training (TVET) in Tunisia and Algeria. As part of the mechanisms established to support this objective, AREA has created a clear learning pathway from the CobotsVETMed Project website to the Smart Step eLearning platform, where all training materials are hosted and made freely accessible.

The training is addressed primarily to TVET trainers and educators, as well as to TVET students and learners in Tunisia and Algeria, and is delivered online through self-paced eLearning modules. Learners may enrol free of charge and earn a certificate upon completion, an arrangement designed with long-term sustainability firmly in view.

1.1 OBJECTIVES OF THE MOOC

The MOOC is designed to equip and upskill TVET trainers and students with:

- With foundational and applied knowledge of collaborative robotics, enabling them to integrate this technology into vocational teaching and training.
- To strengthen the capacity of vocational education institutions in Tunisia and Algeria to deliver training aligned with the evolving demands of Industry 4.0.
- To promote inclusive access to the course, ensuring that groups traditionally underrepresented in vocational training centres can participate fully and benefit equally.
- To provide flexible, open and scalable online learning through the Smart Step e-learning platform, allowing practitioners to learn at their own pace and from any location.
- To foster sustainable knowledge transfer and cooperation among project partners and TVET institutions, building on the outcomes of earlier Erasmus+ initiatives.

1.2 AUTHORS OF THE MOOC

ASTI Automation led the design and adaptation of the curriculum for schools, drawing on its extensive experience in cobot training within virtual environments. The training materials are designed to meet local industry needs in Tunisia and Algeria, ensuring that students and professionals in both countries have

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access to high-quality, relevant educational content. ASTI, ENP and ISSIG contributed by offering expertise in academia, automation, curriculum design and translation into local languages, respectively.

AMTA Academy and all CobotsVETMed project partners support the process contributing expertise and feedback, thereby ensuring that the curriculum meets the specific requirements of each educational institution.

1.3 TARGET GROUPS

The CobotsVETMed MOOC course is designed for TVET trainers and practitioners. It will be implemented inclusively, ensuring access for groups traditionally underrepresented in vocational training centres. The primary target groups within TVET institutions include:

- Young students (15-18 years old): The program equips them with industry-relevant automation skills, significantly enhancing their employability in the modern manufacturing sector.
- Women: By promoting equal opportunities in technical education, the course encourages female participation in automation and robotics, breaking down gender barriers in industrial careers.
- Young people with disabilities: The virtual training environment provides an accessible and adaptable learning space, allowing students with disabilities to engage in cobot education without physical limitations, thus fostering an inclusive workforce development model.
- VET Teachers: adapting curriculums is a tedious work, but a necessary step in the correct development of the trainees capabilities and market development. The first line of work is represented by teachers that have the capacity to change outcomes, by a bottom-up approach.

1.4 COLLABORATIVE ROBOT (COBOT) INTEGRATION

Collaborative robotics content and simulation-based practice will be developed and incorporated into the MOOC training programme, so that cobot technology is delivered as a dedicated version of the MOOC rather than as a separate technical installation. This version will be developed only after feedback has been collected from the survey, ensuring that its content reflects the needs of teachers, learners and local industry in the participating Technical and Vocational Education and Training (TVET) schools in Tunisia and Algeria. It will combine foundational knowledge of industrial and collaborative robotics with hands-on, simulation-based programming practice, enabling institutions to begin teaching cobot applications without immediate dependence on costly physical equipment.

Following the survey, the cobot-integrated version of the MOOC will be refined through a structured process. This begins with the technical setup and adaptation of the training environments to the infrastructure and resources available in schools, followed by a pilot implementation in two partner schools. Educators will be supported through workshops, train-the-trainer activities and ongoing guidance, and feedback gathered during the pilot will be used to improve lesson delivery and the integration process itself. The newly developed curriculum will then be piloted, and engagement, learning outcomes and student satisfaction will be analysed to confirm that the learning objectives are being met. Thereafter, delivery will be scaled up to larger groups of students through successive cohorts, so that cobot-related competencies remain embedded in everyday teaching practice beyond the lifetime of the project.

1.5 STRUCTURE OF THE MOOC

The Massive Open Online Course (MOOC) is a European Qualifications Framework (EQF) Level 4 programme, structured into two distinct modules of 20 hours each, amounting to a total of 40 hours. By the end of the programme, more than 100 students and young people are expected to have completed the course and earned a certificate.

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1.5.1 Module 1: Collaborative Robots – Technical Overview

This module provides a comprehensive introduction to industrial and collaborative robots. It covers the evolution, classification, component architecture, safety features and industrial applications of robots, with a particular focus on collaborative robots (cobots) and their role in Industry 4.0. The module also examines the Universal Robots ecosystem and the UR3e cobot, helping learners to understand its technical characteristics, programming environment, safety functions and integration possibilities in industrial automation.

The module is structured into four units, each concluding with six practical quizzes. Learners are required to achieve a score of at least 70% in each quiz before progressing to the next unit and completing the module. The units are as follows:

- Unit 1: Introduction to Industrial Robots: This unit provides a comprehensive introduction to industrial robots, establishing the foundational knowledge on which the subsequent units of the course are built. It familiarises learners with the definition, components, types and industrial applications of robots, while also introducing the safety principles that govern their use and the key parameters to be weighed when selecting a robot for a given task.

- Unit 2: Collaborative Robots in Industrial Automation: This unit demonstrates how collaborative robots differ from traditional industrial robots, particularly in their capacity to work safely alongside human operators.

- Unit 3: Architecture, Structure and Components of Collaborative Robots: This unit offers a structured examination of how a collaborative robot is built and how its parts operate together as a single system. It explores the layered architecture of a cobot, its mechanical structure and joints, and the actuation, sensing and control components that enable precise and safe movement. The unit concludes by considering the end-effectors, safety systems and integration requirements that determine how a cobot is deployed in a working environment.

- Unit 4: Universal Robots Solutions for Industrial Collaborative Robots: This unit gave a comprehensive explanation on familiarity with collaborative robot solutions offered by Universal Robots UR3e and their practical application in industry. It explores the architecture and main components of the robot, the PolyScope programming environment through which it is operated, and the safety features that enable it to work alongside people.

1.5.2 Module 2: Collaborative Robots – Application Development

This module focuses on the practical development, programming, simulation and integration of collaborative robot applications. It details the use of PolyScope X to model, program, simulate and validate UR3e applications, covering robot motions, variables, control logic, input/output (I/O) and debugging. The module applies these skills through practical case studies on pick-and-place operations, computer numerical control (CNC) machine tending and programmable logic controller (PLC-based) automation, enabling learners to develop and integrate collaborative robotics solutions in realistic industrial manufacturing environments. The module comprises five units, each concluding with six quiz questions. Learners are required to achieve a score of at least 70% in each quiz before progressing to the next unit and completing the module. The units are as follows:

- Unit 1: Introduction to PolyScope X for Modelling and Simulation: This unit prepares learners for the practical chapters of the course by introducing the containerised robot simulation environment in which they will work. It explains what such an environment is, guides learners through setting up a simulated e-Series robot, and familiarises them with the PolyScope X workflow from initial setup to a first test run.

- Unit 2: Robot Programming Fundamentals: This unit exposes learners to work with variables, control structures and digital inputs and outputs, and learn to test and debug their applications through simulation, culminating in the transition from individual modules to a complete industrial application.

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- Unit 3: Case Study I – Industrial Pick-and-Place Application: This is a case study where a learner learns to create a new UR Studio project from an empty workspace. Also learn to add and position a conveyor, source zone, sink zone, box workpiece, sensor, and gripper

- Unit 4: Case Study II – Machine Tending Application Using a UR3e and a CNC Machine: This unit brings together the knowledge and skills developed in the preceding chapters through a practical industrial use case: the automation of machine tending with a UR3e collaborative robot and a CNC machine. It examines how a cobot can load and unload workpieces, coordinate with the machine through digital signals, and operate safely within a shared production environment

- Unit 5: Case Study III – Integration of the UR3e in a PLC-Based Automation System: This closing unit extends the collaborative robot applications developed in the preceding units into a wider automation architecture, in which a programmable logic controller (PLC) coordinates the robot. Building on the PolyScope X offline workflow introduced earlier and the machine tending application of Unit 7, it guides learners through the Bosch Rexroth engineering toolchain, basic PLC programming in CODESYS, and offline simulation with ctrlX COREvirtual.

These components were implemented to foster dialogue with industry and to strengthen the relevance of students' learning to the sector. The MOOC will be translated to two languages, French and Arabic.

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2. THE SMART STEP ELEARNING PLATFORM

The Smart Step eLearning platform was developed in the context of an Erasmus+ project that concluded in December 2025. AREA has assumed responsibility for its continued enhancement and exploitation beyond the project timeline, which has led to the integration of the CobotsVETMed courses into the platform as part of its sustainability and capacity-building strategy.

Smart Step is an intuitive, multilingual platform designed to connect learners with practical courses that enhance real-world skills and employability. It supports a diverse global community of over 2,600 learners from more than 50 countries across Europe and Africa, and offers content in English, French, Italian, German, Portuguese, Amharic and Arabic. It is also built to be accessible (W3C-WCAG). The platform builds competencies in technology, entrepreneurship, agroecology, green waste management, the circular economy, environmental analysis, and collaborative robots, and currently offers 11 distinct courses. In addition, it connects learners with job opportunities and industry partners, effectively bridging the gap between education and employment.

In line with Erasmus+ objectives, AREA is committed to the ongoing improvement of the platform through the integration of advanced functionalities, including Zoom integration and blockchain-based certification, as well as the development of additional courses aimed at strengthening capacity building and promoting sustainable outcomes.

2.1 HOW TO SIGN UP FOR THE SMART STEP PLATFORM

The registration to the smart step elearning platform involves scanning the above mentioned QR Code or going to this link directly https://smartstep-community.com/en/

- Step 1: If you are already a registered member, click sign in and add your email and password. Once you do that, click log in to access the platform.
- Step 2: If you are a new user, got to this page to register https://smartstep-community.com/en/register/
- Step 3: Fill in all your information from Email, Password, Full name, last name to accepting the terms and conditions.
- Step 4: Once you input all information, click create account to receive an instant email from Smart Step.
- Step 5: Check the email address you used to create an account to confirm and activate your smart step eLearning account. (double optin).
- Step 6: Go back to Smart Step sign in page from ‘Step 1’, and login with your new sign in credentials.

2.2 HOW TO ACCESS COBOTSVETMED COURSES ON SMART STEP

The CobotsVETMed is freely accessible to all the Smart Step elearning platform users (over 3,000) and promoted through the platform bi-weekly newsletter. It is also accessible through the Project’s Website.

- Step 1: Visit the CobotsVETMed Project website: https://www.cobotsvetmed.eu/

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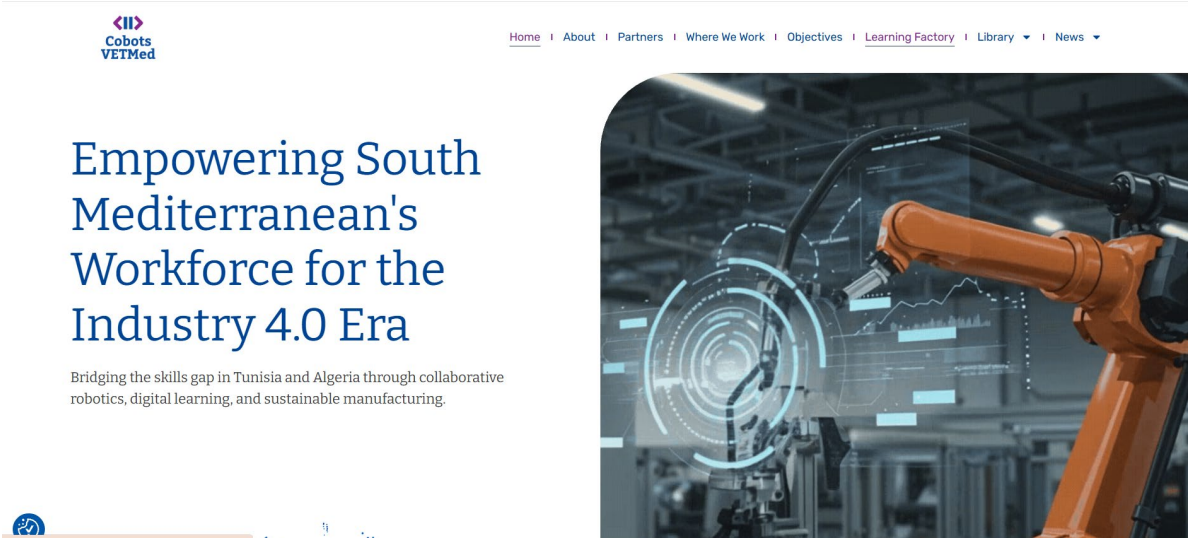

FIGURE 1: COBOTSVETMED WEBSITE

- Step 2: Click on the Learning Factory page: https://www.cobotsvetmed.eu/learning-factory/

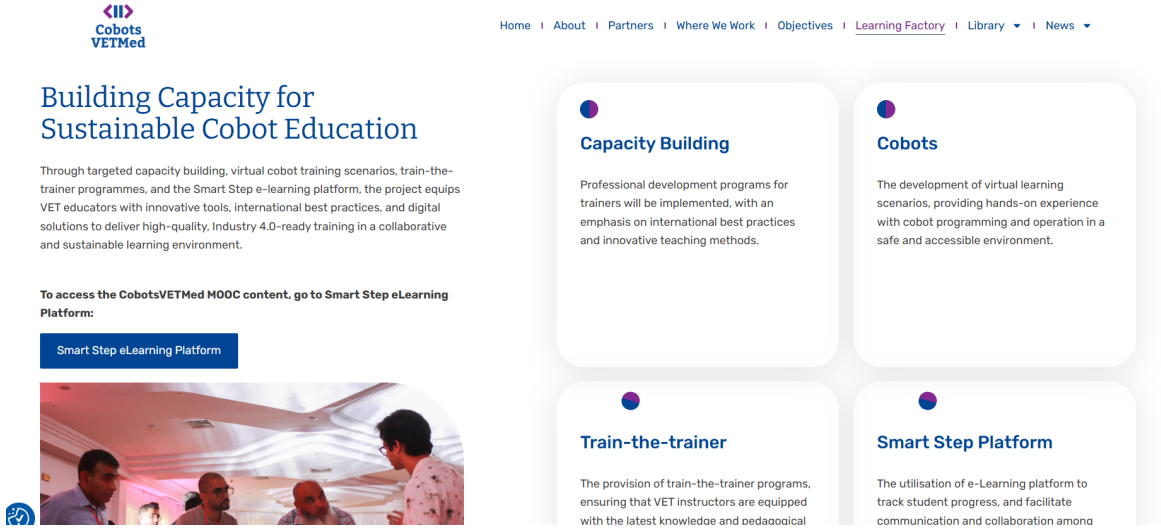

FIGURE 2: COBOTSVETMED WEBSITE – LEARNING FACTORY PAGE

Step 3: Click on Smart Step to go to the platform.

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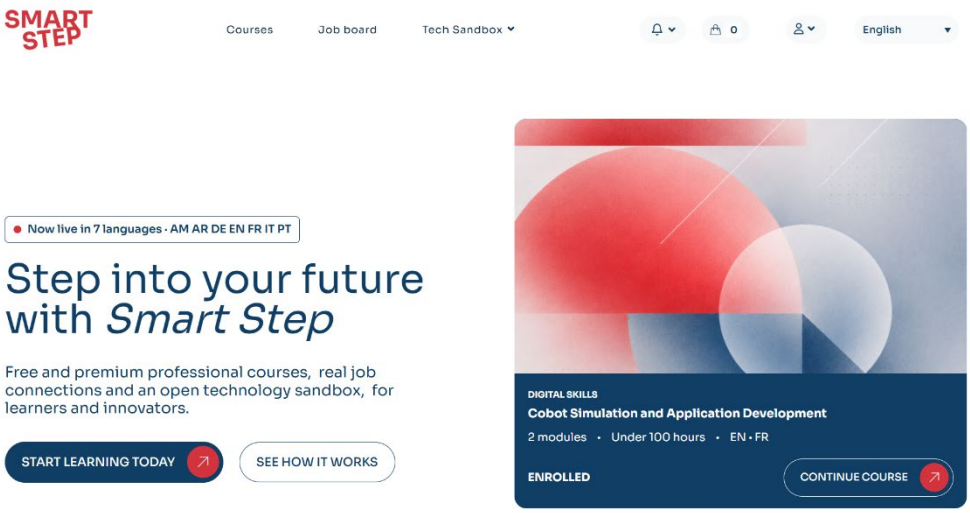
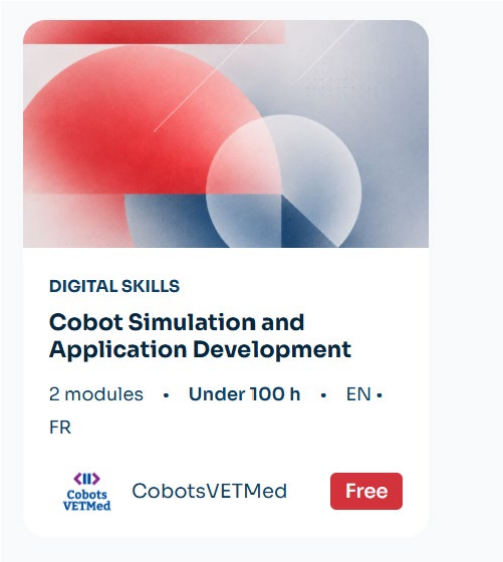


FIGURE 3: SMART STEP E-LEARNING PLATFORM

- Step 4: Log in to Smart Step (new users should click Join for Free to create an account).
- Step 5: Once logged in, click on Courses



- Step 6: Choose Cobot Simulation and Application Development from the Course on the top menu.
- Step 7: Click on Cobot Simulation and Application Development to enrol, complete the course, and earn your certificate.

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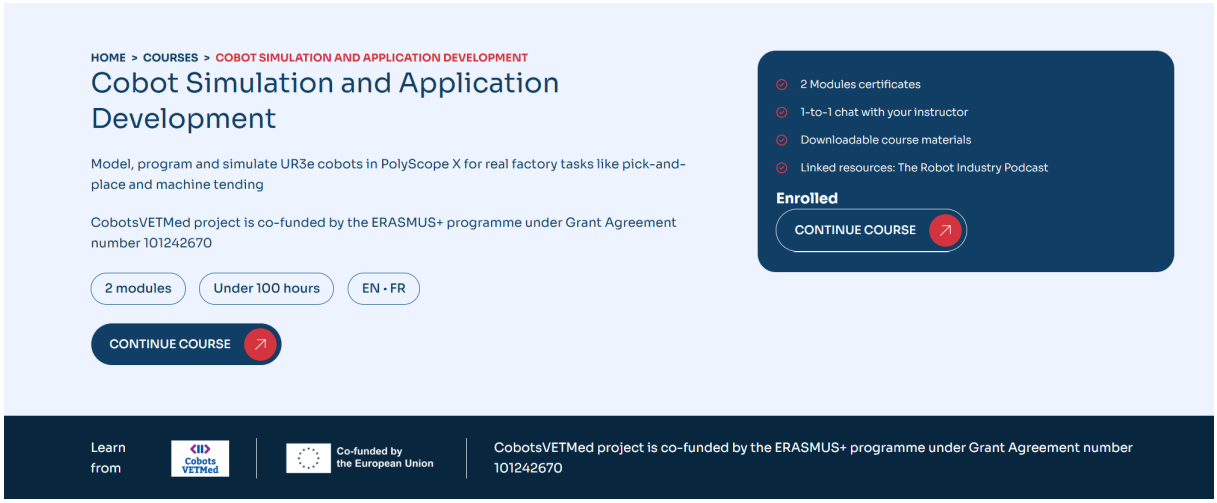
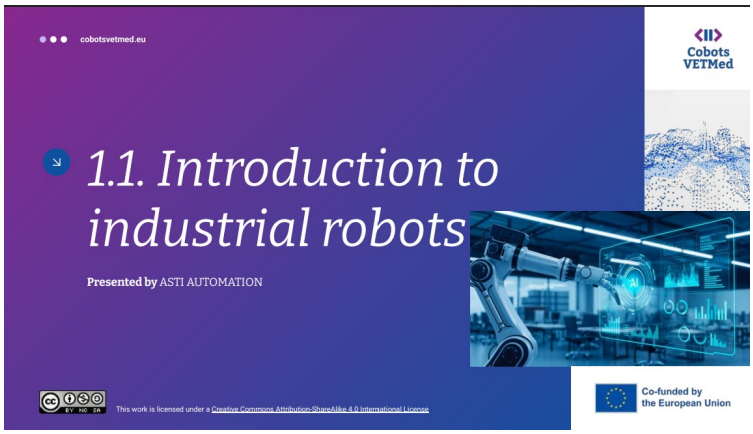


All the courses Units are also downloadable to ensure users with limited internet access can follow the course.

Smart Step is a sustainable dissemination channel that will ensure continued access to the CobotsVETMed digital training resources beyond the project's duration. This approach is intended to strengthen capacity building, support SME workforce development, and accelerate digital transformation in VET systems. Ultimately, it reinforces the European Commission's vision for a resilient, inclusive, and future-ready vocational education ecosystem. All data collected through the CobotsVETMed Project and the Smart Step eLearning platform is processed in compliance with the General Data Protection Regulation (GDPR), and personal data is collected solely for learning and communication purposes.

The CobotsVETMed training materials are made freely available as open-source resources (Creative Commons for non – commercial reuse and adaptation) to encourage reuse, adaptation, and wider dissemination beyond the project lifecycle, in line with sustainability objectives and EU replicability standards.



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