ManuLearn Best Practices

The EIT – Making Innovation Happen

EIT Manufacturing

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Introduction

The main goal of the MANULEARN project is to enhance the innovation capacity of the participating EIT RIS countries by improving their educational framework and by boosting their digital capabilities in order to face the future manufacturing challenges. In this framework, the activity aims to deliver a programme where students, researchers and companies work together to mutually develop skills through co-creating solutions to industrial manufacturing challenges; combining Teaching Factory (TF) and Learning Factory (LF) concepts with Open Innovation practices, addressing the demands of both students and professionals.

Towards this end, ManuLearn Consortium implemented a series of activities – 5 pilot exercises in Lithuania, Greece, Czech Republic and Spain. The knowledge exchange network was established between the activity partners and utilized the proposed ManuLearn methodology and ICT tools.

In these pilot activities industrial challenges, particularly in the field of digitalization well provided and teams from all participating Universities and RTOs responded to the selected ones. Knowledge transfer happened both ways: from industry to academia regarding state of art practices and challenge establishment, and from academia to industry regarding state of art research and potential solutions. Moreover, industry-to-industry and academia-to academia knowledge exchange schemes were also piloted.

The short introduction of organized online events (Teaching and Learning Factories), the findings and outcomes are provided in this summary.

ManuLearn Best Practices

Pilot 1: Industry to Academia Teaching Factory

The first pilot was run by Intechentras, CTU and Precizika Metrology company aiming to transfer knowledge from industry to academia. The knowledge transfer took place using remote communication via Microsoft Teams platform between students and the company's experts. It is a unique opportunity for students to solve a real technical issue of a real company. The task was assigned by experts of metrological equipment – Precizika Metrology, Lithuania, and the challenge asks to: "Propose methods and tools for efficient control of light transmission in raster structures". Participants worked in teams led by experienced colleagues. Teams come up with insight to interesting topic, provided an opinion from their own perspective, and had been rewarded with valuable feedback form industrial site for their effort.

Students of CTU learned real manufacturing challenge, went deeper into metrology manufacturing and topic little out of their main concern (more Physic than Manufacturing engineering), deepened their knowledge in a manufacturing environment and comprehensible communication in foreigner language using specific technical expressions during solution presentations and discussions and organized their time and effort. Students, team leaders and employees found the Teaching Factory inspiring and motivating, content well and Cleary explained covered topics at an appropriate depth. Overall, the sessions were quite attractive and the Teaching Factory project very engaging. The Teaching Factory Challenge meets expectations to bring students closer to the real environment that awaits them in future jobs: communicate within team and to partners, face new and let's say unknown challenges, make resource search and last but not least increase their self-confidence.

Through this TF activity Precizika Metrology got different and interesting solutions for their task and will be able to choose couple of them that fits their need.

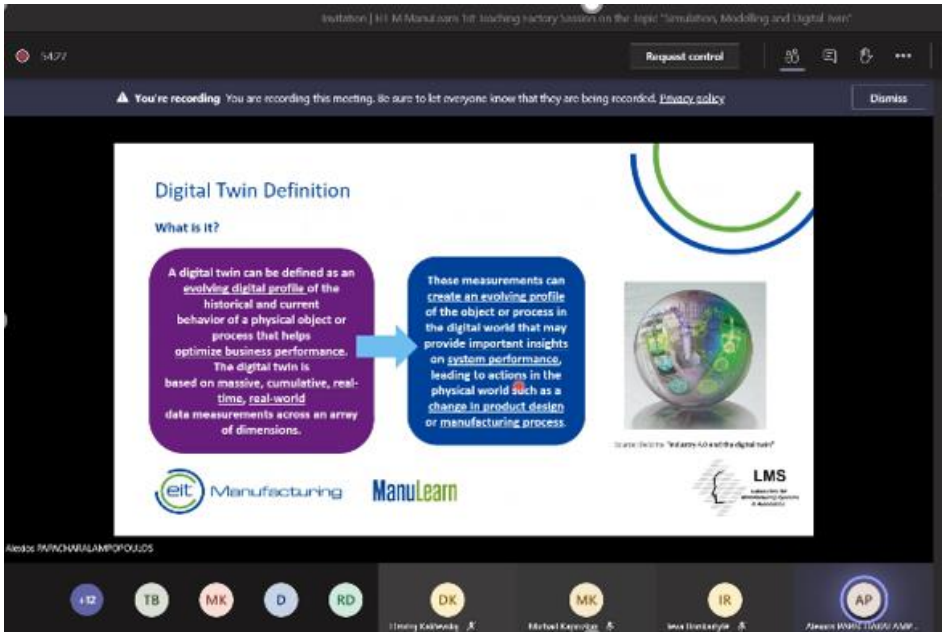
Pilot 2: Academia to Industry Teaching Factory

The second pilot was focusing on the knowledge transfer from academia to industry. Here target audience included industrial people and researchers from academia.

The pilot was performed via virtual seminars on Microsoft Teams Platform in order to introduce engineers from industry to several frameworks related to the Digital Twin concept. The pilot was run by Laboratory for Manufacturing Systems and Automation, Intechcentras, and 2 Lithuanian Companies Western Baltic Engineering and Western Shipyard group.

The scenario of this Teaching Factory pilot was focusing on companies' specific industrial learning needs in the following areas: Additive Manufacturing – 3D Printing, Modelling Simulation, and Digital Twin, Hybrid Manufacturing, Zero Defect Manufacturing.

Through this TF activity employees understood the basics of Digital Twin and deepened their knowledge on Digital Twin application to welding and assembly processes, digital twin implementation in the design of a production line, and visualization of Digital Twin data in manufacturing using Augmented Reality. In addition, employees gained knowledge about frameworks for Digital Twins in manufacturing, the simulation and its capabilities for production.

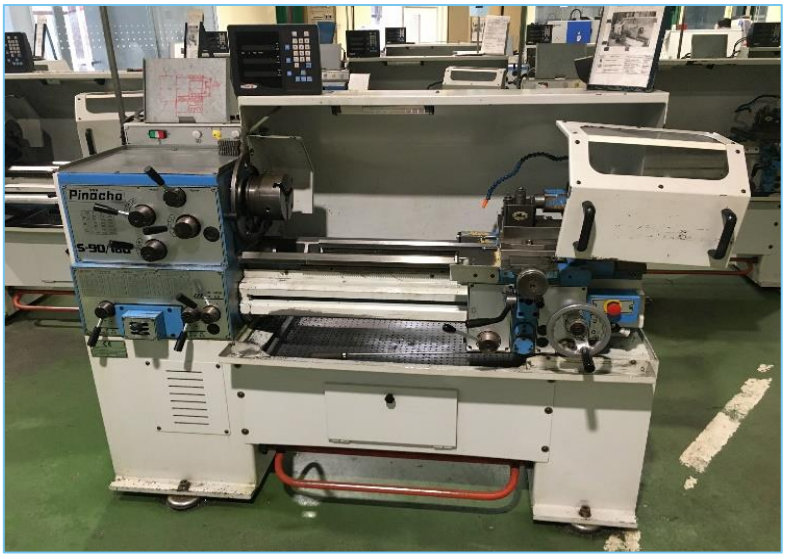


Pilot 3: Industry to Academia Teaching Factory

The third pilot activity was focusing on the knowledge transfer from industry to academia. The scenario of this pilot activity was focusing on the main challenge for the students to situate themselves in a real engineering development ecosystem and begin to familiarize themselves with real problems on topics related to industrial digitalization. Students have been proposed to solve a problem of digitalising a conventional machining machine.

The pilot was run by IMH and the Zitu Informatika (Spain company). This pilot involved students from IMH and company's expert. For sharing the information and receive the solution proposed by the students, Moodle Platform was used and the meeting between technicians and students were performed physically.

The methodology that has been applied is Learning by Doing. Students gained knowledge and expertise on the digitalization of electric signals and the use of the data obtained in intelligent digital environments. Based on participants' feedback, the collaboration with the company had been satisfactory and useful to strengthen their abilities and knowledge about Machine Digitalization.



Pilot 4: Academia to Academia Learning Event

The fourth pilot aiming to transfer knowledge from academia to academia. Here the target audience and actors are from Czech Technical University in Prague, Faculty of Mechanical Engineering; the University of Patras, Department of Mechanical Engineers and Aeronautics, TU Liberec, BME Budapest, and UWB Pilsen.

CTU and LMS organized the pilot as an online learning event that was performed via Microsoft Teams Platform for the technically oriented academic public (students, employees) providing introductions, information, and experiences regarding relevant topics for their work, study, and possible future challenges.

The Learning event was divided into two meetings: the first set of lectures led by LMS and the second by CTU. The first set entitled “Robots in advanced manufacturing processes” and the second set entitled “Manufacturing Intelligence: Robot calibration”.

Participants learned about the connections between robotics and Industry 4.0, fundamentals of robot accuracy, conventional and modern approaches to robot kinematic error examination and minimization, possibilities and requirements of the modern device using, examples of applications, work with the Hexagon Manufacturing Intelligence and LaserTracker, etc.

Pilot 5: Industry to Industry Learning Event

The fifth pilot was organized by Tecnalia and IMH. ManuLearn consortium and several industrial representatives across the Europe participated in this industrial learning event aiming to transfer knowledge from industry to industry. During this online event the industrial representatives met and learned from each other by creating shared visions on how to approach future manufacturing challenges. The participants learned by sharing knowledge, discussing and co-creating solutions in an open innovation context.

The event was conducted via Zoom platform. This event raised awareness of the importance of developing new skills and introducing new digitalization technologies to face present and future manufacturing challenges.

Through this interactive workshop participants learnt from stories of more experienced companies (four presentations from Czech, Lithuania and Spain). In the workshop they understood some of the barriers, good practices, and drivers and business opportunities of digitalization.

The feedback received by the industrial participants is the following: they found the learning event inspiring and motivating, quite engaging and participative. Furthermore, the platform was easy to use facilitating the purpose of the session. Last but not least, the participants expressed their interest to participate in future learning or networking activities related to digitalization in manufacturing.