DIGIMAN

master programme for digital manufacturing

Digital **Man**ufacturing Master Degree to set specialists for the dawn of the Industry 4.0

Project Number: 2019-1-RO01-KA203-063486

C1 – Short Term Training Course

ROBOTIZED WELDING

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1. Executive Summary

The present document aims to provide the main topics to include in the DIGIMAN project Learning Activity, to be carried out in October 2021, in Huelva, Spain.
This Learning Activity will be focusing on ***Robotized Welding*** **(C1)**, which complements the content covered in the Master`s programme (course 2) "Robot systems in joining processes".

This activity will be coordinated, conduced and hosted by Augmented Training Services S.L. (ATS – Spain) with the participation of all partners from DIGIMAN project: European Federation for Welding Joining and Cutting (BE), Budapesti Muszaki es Gazdasagtudomanyi Egyetem (HU), Universidade de Lisboa (PT), Universitatea Tehnica Cluj-Napoca (RO), University of Craiova (RO) and Hochschule Heilbronn (GER).
It must be taken into account that due to the COVID, some partners could not attend in person, which is why a hybrid activity has been chosen.

2. Learning Activities | Main Purposes

DIGIMAN aims to elaborate a master programme study related to digital manufacturing in order to meet the needs and challenges of Industry 4.0 and therefore to improve the performance of the companies.

The contents from this master programme will be tested in a set of Learning Activities (C1-C3), or short-term training courses, which have two basic purposes:

1. Provide training to trainers to acquire new competences for digital manufacturing.
2. Validation of digital education tools.

These Learning Activities will consist of:

- Increasing the teachers competences in terms of digital manufacturing by participating to short-term courses as well as improving their teaching methods using new innovative digital education tools.
- Increasing the teachers digital competences in the field of virtual reality, augmented reality and mixed reality by participating to short-term courses.
- Increasing the harmonization in teaching process by using same teaching methodology and lessons materials according to disciplines and subjects.
- New qualification of the 16 trainers/teachers.

2.1 C1. Robotized Welding

DIGIMAN Learning Activity C1 will be a short-term joint staff training event that will gather all partners for five days to train teachers/trainers from their respective countries in an relevant chapter in the Master`s programme (course 2) "Robot systems in joining processes".

It is important to emphasize that the short-term course organized by ATS will have the goal to transfer the knowledges to the teachers (lecturers) from project consortium.

The topic approached during the short-term course will be related how the augmented reality AR can be used in order to better perform in robotized welding. This learning activity will allow the participants to gain new digital and technical competences which will be later transferred in countries of the project consortium by training other 2 teachers/organization.
The profile of the participants:

- Must be teacher/lecturer in the organization
- Must be involved in teaching industrial engineering/mechanical engineering.
- Must have basic computer skills

16 teachers will be trained during this short-term course and also 14 teachers more after short-term courses from organizations participating in this project (i.e. lecturers from partners' organisations) to obtain new qualifications by participating in courses carried out by each partner.

3. Topics to be covered in the "Robotized Welding" learning activity

For the five days of learning activity, the topics to be covered are the following:

- SOLDAMATIC Training Program
- Robotic Training Program
- Practices on SOLDAMATIC
- Demo at Robotic Lab
- Validation of digital education tools: Sharing of the contents seen during the course and proposals for improvement.
- Examination
- C1 Evaluation

As this is a theoretical-practical course, visits have also been included to:

- Custom Team
- SOLDAMATIC Factory
- Real Lab

With the aim of further enriching the training experience.

Below are the lists of topics and respective sub-topics suggested to be covered, with a reference for suggested teaching hours (around 27 hours of training):

3.1 – SOLDAMATIC TRAINING PROGRAM	Suggested teaching hours
INTRODUCTION	7 hours 15 minutes
SOLDAMATIC IE	
SOLDAMATIC E-LEARNING	
AUGMENTED TRAINING METODOLOGY	

3.2 – ROBOTIC TRAINING PROGRAM	Suggested teaching hours
INTRODUCTION	4 hours
INSTALLATION	
INTEGRATION	
USE OF SOLDAMATIC	

3.3 PRACTICES ON SOLDAMATIC	Suggested teaching hours
Practices using different torches and coupons, as well as different welding processes and materials will be carried out.	4 hours

3.4 DEMO AT ROBOTIC LAB	Suggested teaching hours
The purpose of this demo is to present how welding is performed using a robotic arm Fanuc and KUKA, characteristics and range of parameters which can be chosen depending on the type of welding.	1 hour 30 minutes

3.5 VALIDATION OF DIGITAL EDUCATION TOOLS	Suggested teaching hours
Sharing of the contents seen during the course and proposals for improvement.	4 hours

3.6 EXAMINATION	Suggested teaching hours
Tests will be done to assess the knowledge acquired.	2 hours

3.7. C1 EVALUATION	Suggested teaching hours
A link to the evaluation form will be provided and all partners will evaluate the quality of the training received in this course.	1 hour

At the same time, the following visits are being planned

3.8 CUSTOM TEAM	Suggested teaching hours
Presentation made by the Custom Team where the physical activity carried out in the robotic welding laboratory is transformed into the augmented reality environment with some examples.	1 hour 30 minutes

3.9 SOLDAMATIC PRODUCTION UNIT	Suggested teaching hours
The physical participants in this course will visit the production unit of Seabery Soutions to be able to see the entire technological flow for the realization of the Soldamatic simulators.	1 hour

3.10 REAL LAB	Suggested teaching hours
The physical participants in the course will have the opportunity to enter the welding laboratory where it will be presented the way in which the physical activities related to robotic welding are carried out and the way in which the parameters of work, the ranges of their variation are chosen.	1 hour

4. Participants' Profile

Robotized Welding learning activity will be attended by 16 participants, two for each DIGIMAN partners and four for UCV.

These participants, as previously mentioned, will be teachers/trainers in their respective organisations.

5. Materials to be used in C1 Learning Activity

Trainers who will conduct *Robotized Welding* learning activity need to have at their disposal:

- The list of topics/sub-topics to cover, with indication of suggested teaching hours.
- Agenda with indication of the activities to be carried out during the five days of the short-term training course and respective slots of time.
- Material to carry out the training course, such as:
  - Video conference room
  - Internet connection /WI-FI
  - Laptops
  - Paper and pen
  - Whiteboard and markers

All participants need to fill in a Participants' List (template in Annex) for each day of the learning activity, thus proving they were present in all days of the event.

In the end of the short-term training course, each participant will fill in an online Satisfaction Survey (Created by EWF), which will help the consortium to understand if the event had a positive effect on participants, as well as if there is a need for improvements to be implemented in the next short-term training courses to be delivered (see Annex).

6. Summary of main activities

DAY 1

The course started in the hybrid version as expected with the following participants

Physical

UCV – Gabriel Benga, Adrian Olei, Sorin Savu, Iulian Stefan

ATS- Seabery – Marta Toronjo Leandres, Rocio Diaz Gomez, Concha Álvarez-Pareja Obregón

UTCN- Nicu Balc, Alina Popan

BME- Janos Dobranszky, Dorina Kovacs



Online

Ulisboa – Ines Ascenso Pires, Luisa Coutinho

EWF – Ana Filipa Mendes, Joao Marques

Heilbronn University - Gerrit Meixner, Philippe Schaefer



The course participants were given an overview of the activities to be carried out during the week within the course offered by ATS-Seabery. Marta Toronjo Leandres also presented the fact that the physical participants in this LTTA will have the opportunity to follow the course that ATS Seabery offers to the students on robotic welding.



The physical participants in the course then had the opportunity to enter the welding laboratory where Jesus Maestre, Lucio Labella, Manuel Tello and David Rebollo presented to them the way in which the physical activities related to robotic welding are carried out and the way in which the parameters of work, the ranges of their variation are chosen mentioning that in one of the following days a demonstration of a real case will be made.





Then the students participated in a presentation made by the Custom Team (Diego Infante, Juan Gomez and Fran Rodriguez) where the physical activity carried out in the robotic welding laboratory is transformed into the augmented reality environment with some examples.





There was also a discussion with Basilio Marquinez Garcia, manager at ATS-Seabery, presenting the target group to which the company addresses itself, as well as some administrative and technical aspects that the company has gone through in recent years, reaching a number by several employees to over 100 employees in the last 5 years.



Day 2

The session started in the hybrid version as on the first day with the participants:

Physical

UCV – Gabriel Benga, Adrian Olei, Sorin Savu, Iulian Stefan

ATS- Seabery – Marta Toronjo Leandres, Rocio Diaz Gomez, Concha Álvarez-Pareja Obregón

UTCN- Nicu Balc, Alina Popan

BME- Janos Dobranszky, Dorina Kovacs

Online

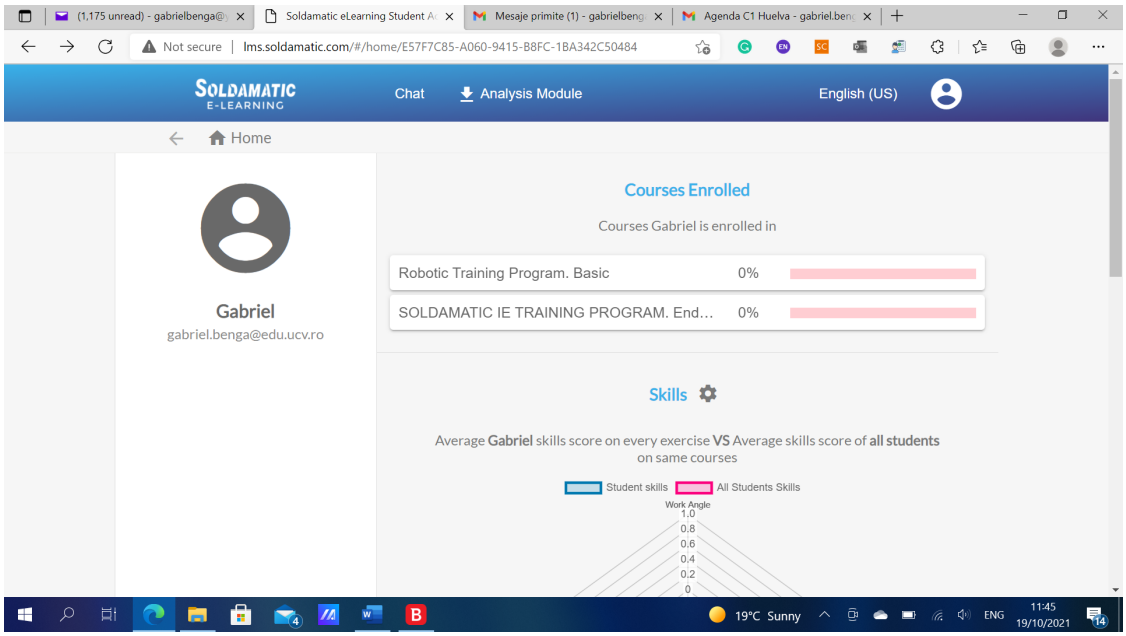
Ulisboa – Ines Ascenso Pires, Luisa Coutinho

EWF – Ana Filipa Mendes, Joao Marques

Heilbronn University - Philippe Schaefer

After a brief overview of the previous day's activities, the lms.soldamatic.com platform was made available, which gives access to the learning management system developed by Seabery for the courses it offers on the robotic welding side. The trainees studied the Robotic Training programme basic.

An asset of this LTTA organized by Seabery is the fact that those who physically participated in this activity had the opportunity to participate in the course that Seabery offers to students of the community in Andalusia.



In the second part of the day participants were able to go to the Robotic Welding Simulation Laboratory where they attended a course offered by Ignacio Zalvide who presented how welding is performed using a robotic arm Fanuc and KUKA, characteristics and range of parameters which can be chosen depending on the type of welding. Then the scenarios contained in the Soldamatic simulator were presented, as well as the connection / interface between the robotic arm and the simulator.







Day 3

The course started in the hybrid version as expected with the following participants:

Physical

UCV – Gabriel Benga, Adrian Olei, Sorin Savu, Iulian Stefan

ATS- Seabery – Marta Toronjo Leandres, Rocio Diaz Gomez, Concha Álvarez-Pareja Obregón

UTCN- Nicu Balc, Alina Popan

BME- Janos Dobranszky, Dorina Kovacs

Online

Ulisboa – Ines Ascenso Pires

EWF – Ana Filipa Mendes, Joao Marques

Heilbronn University - Philippe Schaefer

The physical participants in this course went to the production unit of Seabery Solutions to be able to see the entire technological flow for the realization of the Soldamatic simulators. In this location, Adolfo García -the Technical manager- and Alberto Obregón, presented a short chronology of the development of the Soldamatic simulator starting with version 2.0 then 2.5, 3 and the latest version 4 which is the current version, how to move from one version to the next based on technological advancement but also on feedback from users following the principles of continuous improvement in the ISO 9001/2015 standard family.

Participants were able to see the entire technological process of obtaining the simulator going through all stages of production, assembly, technical quality control and packaging. It was highlighted that three types of simulators can be made:

1. Those dedicated to the didactic purpose having incorporated those basic scenarios necessary to obtain the welder certification.

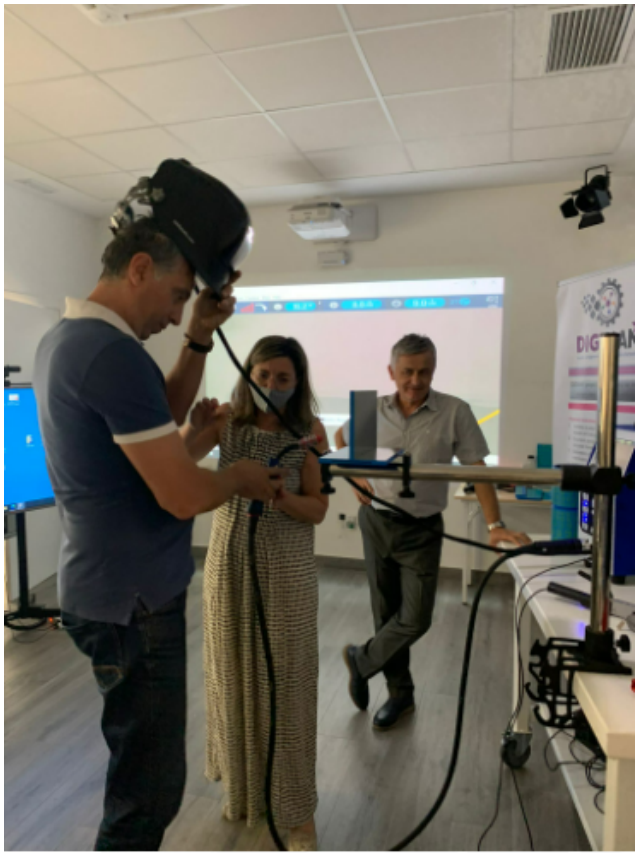
2. The advanced ones that address qualified people which want to get new skills and competences for some specific welding activities.

3. Those made to order by various customers in the automotive, railway industry who have applications of this kind.





In the second part of the day the physical training took place and all the participants tried several application on the Soldamatic simulator based on the theoretical knowledge acquired in the previous day.







Day 4

The course started in the hybrid version as expected with the following participants:

Physical

UCV – Gabriel Benga, Adrian Olei, Sorin Savu, Iulian Stefan

ATS- Seabery – Marta Toronjo Leandres, Rocio Diaz Gomez, Concha Álvarez-Pareja Obregón

UTCN- Nicu Balc, Alina Popan

BME- Janos Dobranszky, Dorina Kovacs

Online

Ulisboa – Ines Ascenso Pires, Luisa Coutinho

EWF – Ana Filipa Mendes, Joao Marques

Heilbronn University - Philippe Schaefer

The participants were invited again in the laboratory of Seabery were a robotized welding scenario was previously prepared and was shown to the trainees. Using a camera connected to both the robotized welding carrier and to a computer allowed the participants to see in real time how the welding was performed outlining the positive and negative aspects through an analysis of the robotized welding parameters



In the second part of the day the different scenarios were presented to the participants and they were trained how to use the LMS of ATS-Seabery which will prove very helpful for the development of the IO4.



Day 5

The course started in the hybrid version as expected with the following participants:

Physical

UCV – Gabriel Benga, Adrian Olei, Sorin Savu, Iulian Stefan

ATS- Seabery – Marta Toronjo Leandres, Rocio Diaz Gomez, Concha Álvarez-Pareja Obregón

UTCN- Nicu Balc, Alina Popan

BME- Janos Dobranszky, Dorina Kovacs

Online

Ulisboa – Ines Ascenso Pires, Luisa Coutinho

EWF – Ana Filipa Mendes, Joao Marques

Heilbronn University - Philippe Schaefer

During the last session of this training course, all participants (online and face-to-face) made an overall assessment of the contents and activities carried out during these 5 days. The session was completed with the completion of the tests to evaluate the theoretical contents and the evaluation of the quality of the course itself.

On this last day, the participation diplomas were also handed out.

ANNEXES

a. Participants' List

C1 – ROBOTIZED WELDING
18-22 October 2021

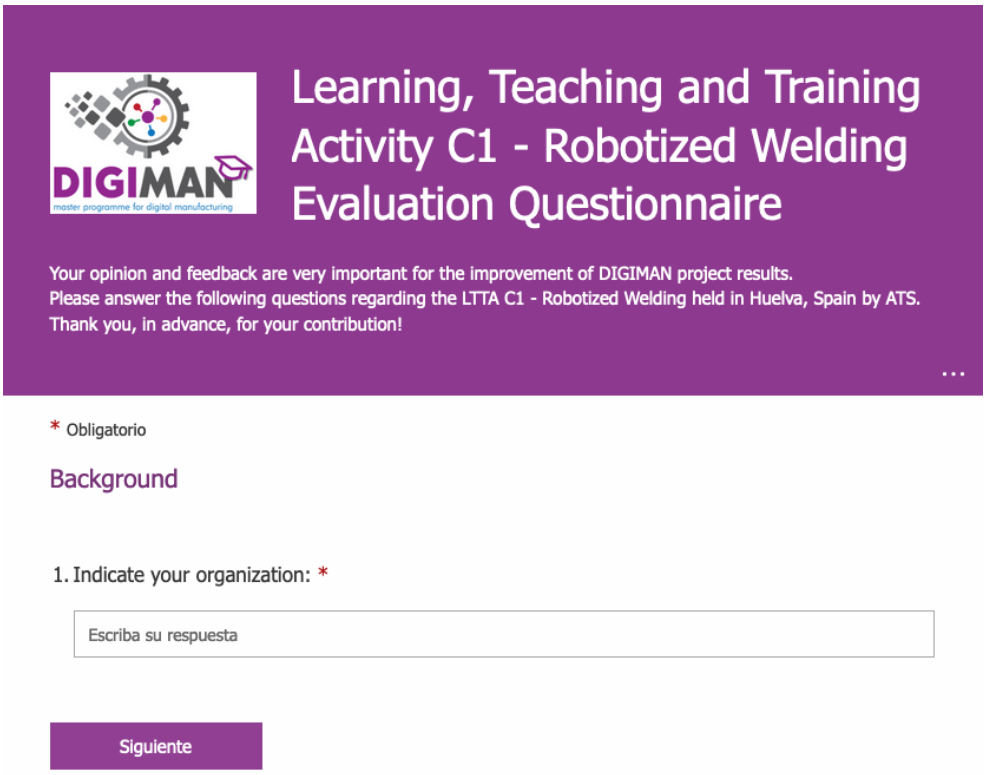
LIST OF PARTICIPANTS

Organizer & Venue: AUGMENTED TRAINING SERVICES
Calle Emilio Haya Prats Doctor, 13, 21005 Huelva - Spain

Day 1 – Monday 18 October

ID	Surname, Name	Partner	E-Mail / Tel.	Signature
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

b. Event Satisfaction Survey



Learning, Teaching and Training Activity C1 - Robotized Welding Evaluation Questionnaire

Your opinion and feedback are very important for the improvement of DIGIMAN project results.
Please answer the following questions regarding the LTTA C1 - Robotized Welding held in Huelva, Spain by ATS.
Thank you, in advance, for your contribution!

* Obligatorio

Background

1. Indicate your organization: *

Escriba su respuesta

Siguiente

c. Certificate of Attendance



Co-funded by the Erasmus+ Programme of the European Union

AUGMENTED TRAINING

DIGIMAN

Project Erasmus+ Programme – Strategic Partnership:
2019-1-RO01-KA203-063486

CERTIFICATE OF ATTENDANCE

LEARNING ACTIVITY
C1 - Robotized Welding

We hereby confirm that **Sorin Savu** from **University of Craiova / Romania** has attended the Short-Term Training Course (Learning Activity) "Robotized Welding", of the Erasmus+ Strategic Partnership Project *DIGIMAN hosted by Augmented Training Services (ATS)*, carried out in Huelva (Spain) between 18 and 22 of October 2021.

AUGMENTED TRAINING SERVICES, S.L.
B - 21.543.755

Basilio Marquínez García
LEGAL REPRESENTATIVE OF ATS

Hosted by:

AUGMENTED TRAINING