LD-SAFE

Laser Dismantling Environmental and Safety Assessment

ONLINE COURSE ON CUTTING TECHNOLOGIES

DELIVERABLE D6.8

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1. INTRODUCTION

The complexity of decommissioning activities in nuclear facilities requires prepared and skilful professionals, making the training programmes a relevant factor to ensure the process is implemented with effectiveness and achieving the demanding safety standards.

The important social, environmental, and economic implications of the promising future of nuclear decommissioning, bring the interest of organizations to participate and contribute to the implementation of more efficient methods and technologies. Those developments should come with a strong knowledge management process to ensure lessons learned and experiences from reactor decommissioning are reviewed and best practices implemented (IAEA, 2022). The development and implementation of training programmes considering best practices promote their implementation among the nuclear decommissioning field.

In general, these training programmes are not only a solid start point for young students and professionals, but also a source of knowledge and skills for experienced nuclear personnel, stakeholders, researchers, or any person with interest in this matter.

In this context, the development of an Online Course on Cutting Technologies, gathering LD-SAFE project lessons learned and experiences, becomes especially relevant.

2. OBJECTIVE AND SCOPE

This report is dedicated to the Online Course on Cutting Technologies developed under the LD-SAFE project, which aims to compile and transmit the best practices and knowledge of the use of laser cutting technology in decommissioning of nuclear facilities, in particular the dismantling of the Reactor Pressure Vessel (RPV) and Reactor Pressure Vessel Internals (RVI).

3. LASER CUTTING FOR NUCLEAR REACTOR DISMANTLING COURSE

3.1. Training Course Access

An online training course, referred as **Laser Cutting for Nuclear Reactor Dismantling Course**, is publicly available at the SOUL platform:

https://tecnatom.learningwithsoul.com/campus/course/view.php?id=169

The used needs to be registered in the platform for accessing the course. The registration may be registration by any of these two options:

- Sending an email to contact@ldsafe.eu
- Completing the form for requesting access: https://tecnatom.learningwithsoul.com/en/contact

The course was released to the public the 28/06/2024.

3.2. Training Course Content

The content of the course is summarized in the following table:

Table 3.1. Training Course Content

ID	Chapter	Content
1	Introduction to Laser Cutting for Nuclear Decommissioning	Context of nuclear decommissioning
		Challenges of RPVI and RVI dismantling
		Laser cutting - Previous experiences
		LD-SAFE Project and associated objectives
2	Laser Cutting Technology	Working principles
		Components of the laser cutting system
		Cutting performances and other relevant aspects
3	Conventional Cutting Techniques - Comparative Analysis	Conventional techniques to dismantle nuclear reactors
		Comparative analysis with the laser cutting technique
4	Reactor Pressure Vessels and Internals Segmentation in Nuclear Reactors	Reactor pressure vessel and internals
		Segmentation plan
		Layout of laser cutting system in nuclear power plants
5	Safety Aspects	Generic Safety Assessment
		Evaluation of Specific Risks • Residual Power Laser Beam • Aerosols generation • Hydrogen generation
		Safety Conclusions
6	Technology Qualification and Demonstrators	Introduction
		Technology Qualification
		In-air Demonstrator
		Underwater Demonstrator
7	Conclusions	Summary of main conclusions

Each chapter of the training programme is considered as a main learning area, being the backbone of the course and organising the content. Learning areas are associated to learning objectives, following Systematic Approach to Training (SAT) principles. Learning objectives are the following:

- Describe the current situation of nuclear decommissioning and explain the relevant characteristics of nuclear reactors.
- Identify the attributes of the laser cutting technique, pointing out similarities and differences with other methods.
- Outline the critical factors associated with performance, risks, and implementation of a laser cutting system in a nuclear reactor environment.
- Describe the main safety aspects about the reactor pressure vessel and internals segmentation using laser technology.
- Identify how the LD-SAFE project promote the future implementation of laser cutting technology on nuclear decommissioning projects.

The online course is designed with different training digital resources (presentation, videos, models, questions, etc.) as to increase trainees' engagement. Basic content is provided, and recommendations for further documentation and training resources are also identified for those trainees seeking for additional information. The training course has an estimated duration of 3.5 hours.

Figure 3.2. Examples of Training Resources

After the course completion, trainees may provide feedback about the training course through a survey. This may allow the potential future improvement of the associated content.

3.3. Training Evaluation and Certification

After finalizing the training content, trainees will be evaluated ensuring that learning objectives are achieved. Following SAT principles, each learning objective is associated to an evaluation criterion.

With a score of 60% or higher in the training evaluation, the trainees will get a certificate of course completion.

Figure 3.1. Example of Certificate

4. CONCLUSIONS

This document describes the online training course developed within the LD-SAFE Project, gathering, among others, main project lessons learned and experiences.

The course is publicly available, since 28/06/2024, at the SOUL platform: tecnatom.learningwithsoul.com.

5. ACRONYMS

IAEA	International Atomic Energy Agency
LD-SAFE	Laser Dismantling Environmental and Safety Assessment
RPV	Reactor Pressure Vessel
RVI	Reactor Vessel Internals

6. REFERENCES

[Ref. 1] LD-SAFE Consortium, 2019. Proposal ID 945255, Laser Dismantling Environmental and Safety Assessment. Horizon 2020 European Union Program.

[Ref. 2] IAEA, 2022. IAEA Nuclear Energy Series No. NG-T-2.3 R1. Training and Human Resource Considerations for Nuclear Facility Decommissioning.