



Friction Stir Welding European Qualifications

# National Implementation Guideline for the EFSW-Operator, EFSW-Specialist and EFSW- Engineer Profiles Curricula

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## Contents

Contents .....	1
Introduction.....	2
1. Personnel.....	3
2. Ensuring the quality of education .....	3
3. Records .....	3
4. Confidentiality .....	4
5. Premises .....	4
6. Teaching personnel .....	4
7. Reference manuals .....	5
8. Documentation.....	5
9. Examinations .....	5
10. Hands-on-Approach Seminars and their conclusions .....	7
11. Conclusions.....	8
12. Annexes .....	9

## Introduction

The IO4 report, National Implementation Guideline for the EFSW-Operator, EFSW-Specialist and EFSW-Engineer Profiles Curricula, provides relevant guidance for implementing training for all the three levels of education covered by the FSW-Tech project: Operator, Specialist and Engineer.

The National Implementation Guideline, hereby described, establishes the mechanisms for implementing the guidelines for harmonized education, examinations and qualifications for Friction Stir Welding (FSW-Tech project Output 2), so that the requirements laid down are applied uniformly by all training centres and the diplomas awarded are recognized across Europe.

The rules are in line with the latest revision of ISO/IEC 17024, and where applicable, necessary additional measures should be implemented. These rules must be updated and reissued every three years and all interested parties are required to implement the changes within one year from the date of issue.

These guideline covers aspects related to Personnel, Quality of Education, Records, Confidentiality, Premises, Trainers, Reference Manuals, Documentation and Examination.

## 1. Personnel

In order to carry out the training appropriately, training centres should have at its disposal competent people, including administrative staff. The organization must define competence criteria for these people to ensure that they have the appropriate training, experience and technical knowledge necessary for the tasks they are entrusted to.

The organization must require its employees and contractors to sign a document by which they undertake to comply with the requirements defined in the Guidelines, including those relating to confidentiality as well as related to commercial and other interests, such as any association with persons to be examined in order not to compromise the principle of impartiality.

Records of staff and contractors must be maintained and must include information on how they educate, train and maintain a level consistent with the latest developments in the field.

All employees and contractors must have clear job specifications, issued along with instructions describing their duties and responsibilities.

## 2. Ensuring the quality of education

The organization shall operate a quality management system (QMS) as described in the quality manual, working procedures and related documents. The QMS must include at least the following information.

- a) Quality Policy Statement
- b) A brief description of the legal status of the Organization
- c) Details of staff training provision
- d) An organizational chart explaining the system of rights, responsibilities and allocation of functions
- e) Details of documented procedures for evaluating applications for education
- f) Details of documented procedures for evaluating candidates enrolled for certificates
- g) Details of appeal and complaint handling procedures

In order to facilitate its use, the Organization may also prepare a Guideline in the national language.

The organization shall conduct regular management reviews at least once a year, covering key areas of its activities, including:

- Results of external and internal audits
- Personnel, management or organizational changes
- Incoming complaints and appeals
- Information on the number of candidates and their success rate
- Comments or improvements to the quality manual and procedures.

The Organization shall also conduct regular internal audits at least once a year by persons who do not have executive responsibilities within the Organization. Such an audit should be aimed at verifying that the QMS continues to meet the Organization's requirements and is properly implemented. The record of management controls and internal audits shall be maintained for a minimum period of 5 years.

## 3. Records

The organization shall maintain a system of records appropriate to the circumstances and shall comply with the regulations, including the means for confirming the status of a qualified person. The records must show that the qualification process has been successfully completed, in particular with regards to application forms, evaluation reports and other documents related to the award of qualifications.

Records must be identified, managed and made available in such a way to ensure process and information consistency and confidentiality. Records shall be maintained for at least five years. The organization must establish and maintain a database of certificate holders in its own country.

#### 4. Confidentiality

The organization shall keep all information obtained in the course of its activities confidential by any means enforceable. This undertaking shall include all persons working within the institution, including members of committees and external bodies or persons acting on its behalf. Such information may not be disclosed to an unauthorized party without the written consent of the organization or the person from whom it was obtained, except where disclosure of such information is required by law. If the Organization is required by law to release such information, the organization or the person concerned shall be informed in advance of what information is to be provided.

#### 5. Premises

The premises must be clean, well-lit and comfortable. Each student must have enough space on the desk and good access to the test samples. Classes shall have appropriate desks or tables and shall be equipped with appropriate teaching aids such as whiteboards, overhead projectors, data projectors, closed circuit television, slide projectors and video equipment as required for the relevant courses.

An important part of the training process is the practical part of the training, which must be carried out in premises that suit mainly the safety of trainees and trainers. The premises must be equipped with ventilation and the equipment itself that welds with FSW technology. Various FSW weld samples of different materials can also be placed in the rooms, even with the most common weld failures that arise when using FSW welding materials. It is possible to carry out a practical part of the training also in the premises of a customer who has equipment for welding with FSW technology.

The course hours must be supported by good quality visual means such as: slides, overhead projectors, projection film and / or video.

Each Guidelines specifies specific requirements for equipment and samples with respect to the specific competence units in question.

#### 6. Teaching personnel

Education must be closely linked to industrial practice and it is important for the teaching staff to have constant contact with practice. Teaching staff needs to combine:

1. Teaching ability – proof of training in lecturing, speaking and performing in public and verbal communication
2. Competence in the subjects taught
3. Knowledge and experience of common industrial practice in the relevant subjects taught
4. Practical skills in demonstrating welding practice

The organization shall provide a reasonably complementary body of lecturers who possess the collective knowledge and skills necessary to undertake the course to be implemented in an effective manner. The number of members of the teaching staff must be sufficient to ensure that the provision of the core professional knowledge and industrial practice covering the curriculum is adequately represented by the teaching staff and external lecturers. This team must also provide resources for the development, updating and monitoring of the training programs.

The board of lecturers must maintain contact with normal industrial practice and one of the ways how to achieve this is to involve teachers in consultations. The use of external lecturers from industry is also an appropriate way of putting a strong industrial element into the course.

## 7. Reference manuals

The organization must maintain a reference library of the key materials available to trainees for preparatory studies. This library must include a complete set of standards relevant to the subjects taught and listed in the relevant Guidelines.

The FSW-Tech project recommends, as indicative literature to support the course, to use the Friction Stir Welding Handbook for Operators and the Friction Stir Welding Handbook for Specialists and Engineers (included below).



FSW-TECH - Book -  
EFSW-O FINAL.pdf



FSW-TECH - Book -  
EFSW-(S+E) FINAL.p

For the trainers providing the course a set of materials covering all the CUs is available for all three levels of education, in several languages: EN, PT, SK, SL and RO and can be found in the project website: [www.fsw-tech.eu](http://www.fsw-tech.eu).

## 8. Documentation

The entire collection of updated course records must be maintained to ensure uniformity of courses in the event of any personnel changes. The lessons must be supported by quality guides issued to students containing the key and up-to-date information for viewing.

## 9. Examinations

### **Introduction**

The specific requirements for the performance of examinations are set out in the guidelines for education, examination and qualification. The exams must be planned and organized in such a way as to ensure that all the requirements of the Guidelines concerned are objectively and systematically verified with sufficiently documented evidence confirming the given case.

### **Examiners**

The organization shall appoint examiners for each qualification that has been authorized. The examining team (at least 2 people) must be elected by the organization from the list of examiners authorized for each examination session. The responsibilities of the team of examiners are as follows:

- a) To organize examinations (both written and practical)
- b) To conduct examinations and mark written, oral and practical examinations
- c) To decide on borderline results
- d) To decide on the test results.

The examiners must:

- Be well acquainted with the qualification scheme
- Have a thorough knowledge of the relevant test methods and test documents
- Have adequate knowledge and competencies in the areas of examinations
- Have a fluent knowledge of the language of the examination, both in written and oral form
- Being free from any interests in order to make impartial and non-discriminatory judgments.

If there is a potential conflict of interest with the examiner when examining the candidate, the organization shall take measures to ensure that the confidentiality and impartiality of the examinations has not been compromised.

### **Venue**

The examinations shall be conducted at the premises and times predetermined by the Organization.

### **Premises**

Written examinations must be done in a quiet, well-lit, well-ventilated and comfortable room.

Oral tests shall be conducted in quiet premises.

### **Admission to test**

The rules for admission to the examinations leading to the award of the certificate are set out in the relevant Guidelines. The organization shall require the submission of supporting evidence from examined persons to ensure that the conditions for access to the exam, including education and training, are met.

### **Supervision (of the examination)**

The organization must have procedures in place to ensure that candidates suspected by the examiner of cheating are adequately addressed.

### **Examinations**

The examination questions must be provided by lecturers or other competent persons and must create a collection from which the examining team can choose for each exam that will be used for each written work. The organization must have a system to approve the writing topics to ensure that they cover the test subject and have an appropriate level of difficulty.

The database examination questions are attached to this guidelines as Annex 2.

### **Security and confidentiality**

The organization shall ensure the security and confidentiality of all records and information related to the examinations, markings, etc. throughout the whole process. Written work must be maintained in a secure manner to prevent access by unauthorized persons. Answers to the questions should be typed or printed and copied under safe surveillance conditions. Written work should be kept, for example, in sealed envelopes stored in locked areas to which only the supervisor has access.

## 10. Hands-on-Approach Seminars and their conclusions

In order to validate the curricula and guidelines prepared in the framework of the project, 3 hands-on-approach seminars were held in Slovakia, Romania and Portugal. The seminars in Slovakia were focused on the competence units dedicated to Operators; and in Portugal and Romania for the Engineer and Specialist profile.

The number of participants in each country varied:

- 6 participants in the Slovakian HOAS;
- 35 participants in Romania;
- 55 participants in Portugal.

The seminars had theoretical and practical parts including case studies and had durations ranging from 2 to 6 days. The overall evaluation of the hands-on approach seminars (HOAS) from the participants assessment was very positive and met the objectives initially proposed in all three countries.

The main conclusions from the seminars were as follows:

- The topic of the training was considered as very interesting
- The main recommendation on this topic is the creation of teaching and presentation materials that should be interactive and would allow the participants to continuously incorporate new up-to-date information on the technology from science and research, but also from practice.
- There is room for improvement mainly by enriching each session with other interactive online tools (games/quizzes) to the presentations developed, in order to increase the engagement from the participants.
- The case study sessions can incorporate the standards to develop FSW parameters

Another suggestion was to include a more comprehensive case study where all the stages of development are approached instead of only the results.

Overall, the suggestions made by the participants lays down, mainly, on the approaches used in the classroom, rather than on the curricula itself. For that reason, the consortium considers that the developed Guideline (result of output 2) is presently ready for approval and implementation.

The recommendations herewith included should not limit, in the short term, the guideline approval by the respective EWF Working Group. Likewise, it is suggested to make periodic evaluation satisfaction reports, to guaranty the principles of Continuous Quality Improvement.



Figure 10-1: (a) Theoretical part of the HOAS in Portugal; (b) Practical part of the HOAS in Slovakia; (c) Materials for participants of the HOAS in Romania

The detailed information about each of the national seminars is included as annex of the present report.

## 11. Conclusions

These recommendations set out the mechanism by which the Guidelines for harmonized education, testing and certification are put in place so that unambiguous requirements are applied uniformly by all concerned and that the awarded certificates are mutually recognized.

The aim of the harmonised implementation regulation is to specify in more detail the various activities referred to in Guidelines: ***Minimum Requirements for Education, Examination and Qualification*** which are an integral part of this document and form the Annex 1. The most important factor in harmonized education and examination is the uniform interpretation of the Guidelines in all organizations involved in this activity to ensure consistency. On the basis of a uniform interpretation, we can create harmonized education and examination which will be applicable in all countries interested in using it.

## 12. Annexes

Annex 1: Report from the Hands-on Approach Seminar Slovakia	 HOAS - SK Report Final.pdf
Annex 2: Report from the Hands-on Approach Seminar Romania	 HOAS - RO Report Final.pdf
Annex 3: Report from the Hand-on-Approach Seminar Portugal	 HOAS - PT Report Final.pdf