

Case study on welding hazards affecting industrial safety

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Welding, industrial safety, training, hazard

1. Introduction

Welding is currently the most important permanent joining method. The industrial use of welding is very expensive due to the manual labor, which amounts to about 80...90 % of the production costs [1]. In industrialized countries, 0.2 ÷ 2% of the labor force works in the welding field. Most of the welders work in shipyards, they build transportation means, work in civil engineering, in the petrochemical industry, in the mining industry and metallurgy [2]. Besides the fact that these workers are exposed to smoke and toxic gas emitted following the welding processes, which may endanger their health, the employers must deal with the risks of explosion and fire and thus must apply preventing measures.

Taking into account the hazards of the workplace for this category of personnel (fume, noise, vibration), factors with high risk potential on the safety of welders, the necessity of management system implementation and personnel training has a major importance, both for employers and for employees [3].

Each company must have a person and specialized compartment responsible with providing the necessary information regarding welding hazards upon environment, health and safety as well as training and supervision. The technical personnel that leads the health, safety and environmental management system in the company must possess a strong knowledge and necessary expertise in these areas in order to obtain the expected results (fewer accidents, fewer occupational diseases, clean and safe workplaces, friendly environment). These skills can be attained only through training and a certification system used at European level [4, 5].

The overall aim of the Weld Train - HSE project is to harmonize training and qualification of technical personnel (managers, engineers, technicians and foremen) with responsibilities in fields like health, safety and environment management in welding.

The project consortium is composed of ISIM Timisoara, Romania, ISQ Portugal, IIS Italy and ISPL Poland. The envisaged goals of the project are to raise awareness on prevention and risk reduction of the negative impacts on the environment, health and safety in the companies using welding as the main production process [6], as well as on adopting of a harmonized training and certification system by all European countries members of the EWF network.

The case study data presented in this paper represents the partial results of a survey conducted in the frame of the project, regarding current safety issues of the welding industry. The presented results refer to the current situation at Romanian national level.

2. Case Study

The presented survey conducted by the National R & D Institute for Welding and Material Testing - ISIM Timisoara was carried out from the 11th of March till the 30th of April 2013 and 30 answers were collected [7]. The primary statistical data regarding the type of transmitting and number of responses are presented in Figure 1.

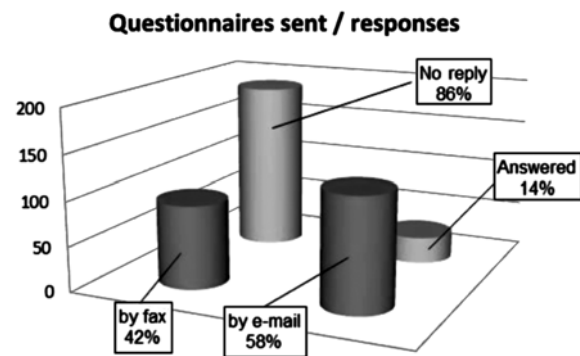


Figure 1. Questionnaires sent / responses [7].

E-mail and/or fax were chosen as the surveying method, thus questionnaires were sent by e-mail and fax to the potential final users. The questionnaire consists of two parts:

- Company data, containing information such as the size of the company, main activity fields, type of realized products, applied welding methods, base materials and certification data;
- Main part, containing 19 questions divided in 4 categories (A - Health, B - Safety, C - Environment, D - Courses and Training).

In the questionnaire, interviewees were asked to choose one answer “yes” or “no”, but in some cases there was no answer and this situation was also taken in consideration during the analysis and the statistical processing of the collected data [7].

3. Results and Discussion

As already stated, this paper presents only the responses regarding safety in the field of welding.

The results in the form of collected answers to the 7 questions regarding safety are presented below, both in table (Tables 1-7) and in graphic (Figs. 2-8) format.

Results of each question are presented in a table which consists of 3 columns:

1. Answer Yes (with numerical value and percentage value);
2. Answer No (with numerical value and percentage value);
3. W.A. – without answer (with numerical value and percentage value).

Table 1. Question 1.

1.	Are you interested in the assesment of risk and solutions therefor?	YES	NO	W/A
a)	The Hazards and Assessment of Risks	21 70%	9 30%	0
b)	Solutions and procedures for the protection of employees from ergonomic risk factors.	21 70%	9 30%	0

B: Safety: Question 1

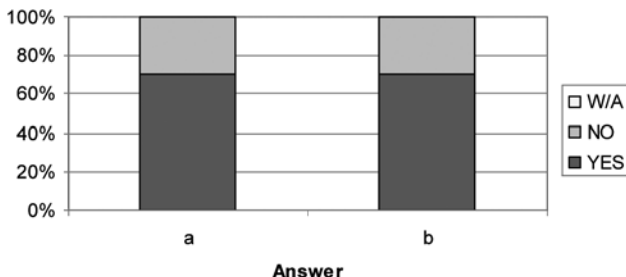


Figure 2. Responses to the 1st question regarding safety issues in the field of welding.

Table 2. Question 2.

2.	Which of the following Safety Measures and General Safe Practices apply in your company?	YES	NO	W/A
a)	Preparation of the welding or allied process	26 86.66%	4 13.33%	0
b)	Fire prevention and protection	28 93.33%	2 6.66%	0
c)	Safe storage and handling of gas cylinders	26 86.66%	3 10%	1 3.33%
d)	Welding or allied processes in a confined space	21 70%	8 26.66%	1 3.33%
e)	Welding or cutting in maintenance and dismantling of plant	21 70%	8 26.66%	1 3.33%
f)	Ventilation of the working place	24 80%	5 16.66%	1 3.33%
g)	Gas supply safety devices	19 63.33%	10 33.33%	1 3.33%
h)	Protective equipment.	27 90%	2 6.66%	1 3.33%

B: Safety: Question 2

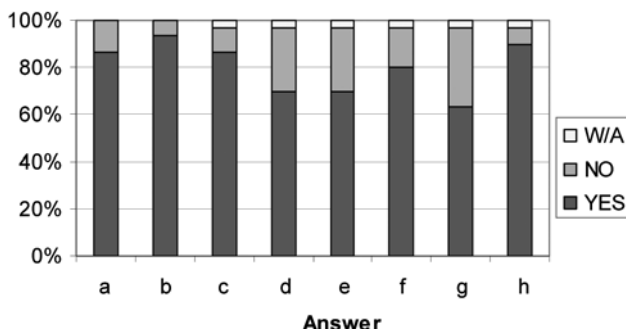


Figure 3. Responses to the 2nd question regarding safety issues in the field of welding.

Table 3. Question 3.

3.	Which of the following preventing measures are important for your company?	YES	NO	W/A
a)	Checking and maintenance of plant and equipment	27 90%	2 6.66%	1 3.33%
b)	Emergency response procedures and equipment, as response to possible emergency situations	24 80%	5 16.66%	1 3.33%

B: Safety: Question 3

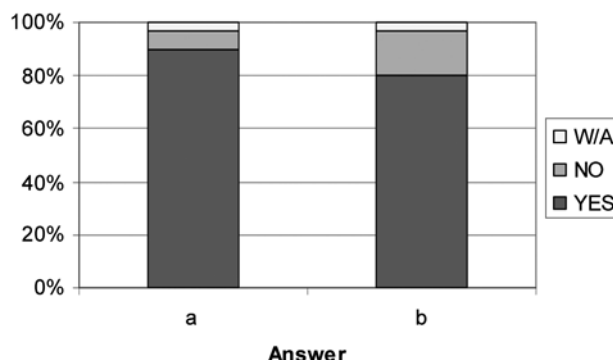


Figure 4. Responses to the 3rd question regarding safety issues in the field of welding.

Table 4. Question 4.

4.	Do you need to know the following recommendations, procedures and responsibilities?	YES	NO	W/A
a)	The Code of Practice (the "COP") that recommends safe practices in gas welding and flame cutting and describes the steps and measures to be taken in protecting workers from the hazards	24 80%	5 16.66%	1 3.33%
b)	Policies and procedures that satisfy the code and legal obligations of the employer	24 80%	5 16.66%	1 3.33%
c)	Responsibilities of concerned persons: proprietor, management personnel and employees	25 83.33%	4 13.33%	1 3.33%

B: Safety: Question 4

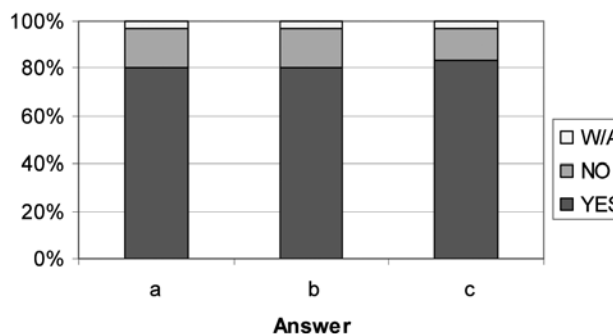


Figure 5. Responses to the 4th question regarding safety issues in the field of welding.

Table 5. Question 5.

5.	Which of the following information on Material Safety is important for you?	YES	NO	W/A
a)	Hazardous Ingredients/Identity Information of materials; safe exposure limits for workers	26 86.66%	3 10%	1 3.33%
b)	Reactivity Data, related to air, water, or other chemicals; conditions for prevention	21 70%	8 26.66%	1 3.33%
c)	Control Measures related to materials: protective clothing and equipment, ventilation, hygiene practices	27 90%	2 6.66%	1 3.33%

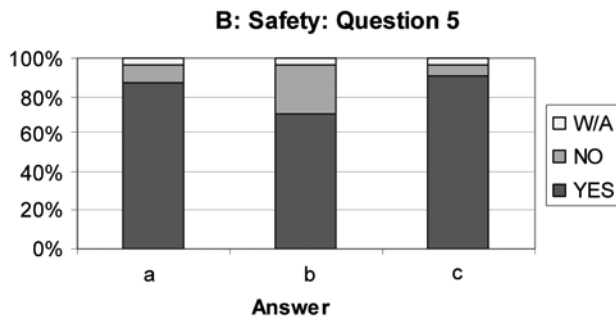


Figure 6. Responses to the 5th question regarding safety issues in the field of welding.

Table 6. Question 6.

6.	Do you know the fire and explosion hazard data of materials and firefighting procedures that apply in the following cases?	YES	NO	W/A
a)	Unsafe acts by oxy-acetylene flame	25 83.33%	4 13.33%	1 3.33%
b)	Unsafe use of oxygen installations and devices	23 76.66%	6 20%	1 3.33%
c)	Inadequate application of plastic materials	16 53.33%	13 43.33%	1 3.33%
d)	Improper utilizing of inflammable materials	23 76.66%	6 20%	1 3.33%
e)	Inadequate use of the welding equipment	23 76.66%	6 20%	1 3.33%
f)	Inadequate use of high pressure gas cylinders	22 73.33%	7 23.33%	1 3.33%

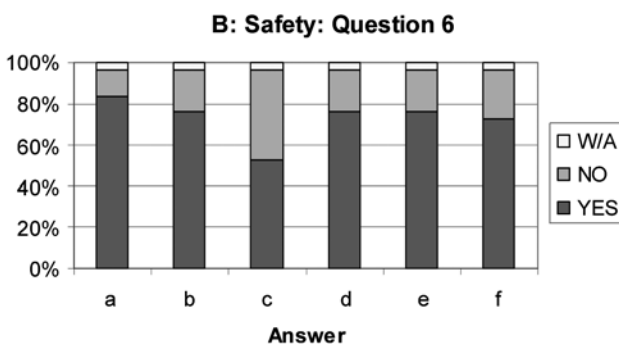


Figure 7. Responses to the 6th question regarding safety issues in the field of welding.

Table 7. Question 7.

7.	Are you interested in Information, Instruction and Training concerning the following measures to prevent operating accidents and fire?	YES	NO	W/A
a)	Procedure for lighting up and shutting down the blowpipe by oxy-acetylene flame	22 73.33%	7 23.33%	1 3.33%
b)	Safe use of oxygen installations and devices	19 63.33%	10 33.33%	1 3.33%
c)	Adequate application of plastic materials	15 50%	14 46.66%	1 3.33%
d)	Proper utilizing of inflammable materials	20 66.66%	9 30%	1 3.33%
e)	Adequate use of the welding equipment	23 76.66%	6 20%	1 3.33%

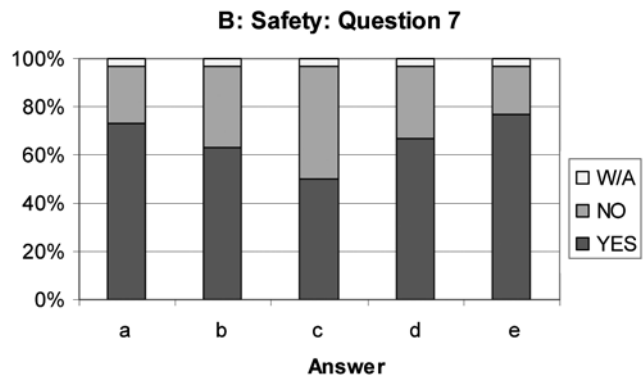


Figure 8. Responses to the 7th question regarding safety issues in the field of welding.

The results of the questionnaire show that 70% of the interviewees are interested in the assessment of risk and finding the necessary solutions (Question 1). Furthermore, over 80% of them agreed that it is of great importance for them to know The Code of Practice (the “COP”) that recommends safe practices in gas welding and flame cutting and describes the steps and measures to be taken in protecting workers from the hazards, policies and procedures that satisfy the code and legal obligations of the employer as well as the responsibilities of concerned persons: proprietor, management personnel and employees (Question 4). It can also be seen that the interviewees lack certain information regarding fire and explosion hazard data of materials and firefighting procedures that apply, for example, in case of inadequate application of plastic materials (Question 6). The answers to Question 7 show that the level of interest of the interviewees is highest in the field of adequate use of welding equipment (76.66%) and lowest in the field of adequate application of plastic materials (50%). This shows that the majority of the responding companies do not operate in the field of plastics manufacturing.

4. Conclusions

This paper summarizes the responses of a survey at Romanian national level regarding the current safety issues in the welding industry and the existing interest for training in this field. The survey was conducted by ISIM Timisoara in the frame of the Weld Train – HSE project.

The results show a high interest among industrial actors for training and further knowledge in the field of assessment of risks in welding and finding the necessary solutions. This interest is further backed up by the lack of certain information regarding safety hazards and the necessity of knowing the Code of Practice (the "COP") in welding.

Overall, the obtained results are considered positive since the majority of the interviewees are interested in participating at the training course to be organized in the frame of the Weld Train – HSE project.

5. Acknowledgement



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Lifelong Learning Programme









Health, Safety and Environmental Training for Welding Personnel

LLP-LDV-TOI-2012-RO 036



Next meeting of the project:
8-9 May 2014, in Lisbon - Portugal.

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