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Improving Safety through Developing Training Programmes in Safe Working Practices

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The Master's programme in Industrial Management has been a challenging but exciting experience for me. It is not an exaggeration to say that it has taken my analytical, research and self-leadership skills to a totally new level.

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This thesis aims to improve safety in the case company by developing training in safe working practices (SWP) on the example of developing a training programme for welding operators. The company is a new refrigerating and gas compressor assembly plant in Russia. Presently, any systematic training in SWP is missing, and instead of a formal training, the new company employees receive only some tutoring during the first days of employment. This situation leads to increased chances of injuries and incidents at the operational site, as well as does not comply with the national health and safety regulations.

To reach the objective, best practice in training programme development are studied and, as a result, two conceptual frameworks are drafted. The first framework is used as a baseline during the interviews with the case company stakeholders to understand the current state of safety training provision. The study utilises a case study approach, and merges the data from the interviews, the best practice and benchmark documents to create a proposal.

The outcome of this study is a proposal for training in safe working practices for welding operators consisting of five elements: (a) materials for classroom training in the form of presentations, (b) a practical training programme, (c) a pre-training and (d) a post-training assessment test, and (e) recommendations on the training delivery. The proposal was validated in the form of a full-scale training implementation and received positive feedback from the key stakeholder. The company intends to adopt the proposed materials in order to develop further trainings in SWP for other company professions.

Keywords	Safe working practices, Training programme, Health and Safety, Safety programme for welding

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1 Introduction

In the era of continuous change, companies are compelled to be responsive and flexible. Business practice suggests that any company is able to survive and grow only if it can adjust to external and internal requirements which keep appearing due to political, economic, technological and social changes. It means that its employees, both new and existing, need to gain knowledge, skills and understanding through learning and development. (Brauer 2006: 1-3) This makes it important for any company to take care of employee training in order to keep up with the change and advance its performance.

Along with professional training, safety is another critical concern for companies. Occupational Health and Safety (OHS) makes an integral part of doing business nowadays. It is included in most companies' values, incorporated in their processes and put into practice in the form of employee trainings in OHS. As workplaces are getting more complex, there is a growing need to understand the causes of incidents and take such safety precautions that would prevent them. This understanding starts from government officials and company leadership, and is subsequently passed down to government inspectors, health and safety professionals, supervisors and workers. Effective conveyance of this information is attained through education and training. (Hecker 2015) The training function within an organisation needs to be coherent with its values, goals and strategy and be implemented accordingly.

Ensuring health and safety of employees is a legal responsibility of every company. It implies that OHS trainings establishment in an organisation is stipulated by law. According to OHSAS 18001:2007 (an international OHS management specification), organisations shall identify training needs related to OHS risks and OHS management system. From the employee perspective, information activities on health and safety help to develop a positive health and safety culture and encourage workers to take care of themselves. It is essential for workers to know how to protect their lives and health and those of their co-workers while at work (Alli 2001: 103-105). This makes OHS trainings beneficial for both, the employees, who receive necessary skills and knowledge, and for the employers, who fulfil their legal obligations and prevent undesired events.

Real life examples and company practices show that OHS trainings have a crucial effect on safety-related behaviour and help employees to identify potential hazards and risks,

to understand operating procedures, make safe decisions and properly respond to emergencies. On the other hand, it is counterproductive for companies to treat training as a panacea in solving safety performance problems, while other measures can be more effective (Blair and Seo 2007: 42). A training will be an effective solution for safety improvement if the decision to provide it is well-founded and the training is integrated into the work process.

1.1 Key Concepts

OHS is a concept that generally refers to health, safety and wellbeing of people at work. A deeper understanding of the term can be gained through looking at its constituent parts. *Health and safety* are defined as “the laws, rules and principles that are intended to keep people safe from injury or disease at work and in public places” or “the part of the government and legal system that deals with people’s health and safety at work” (Cambridge Dictionary; Macmillan Dictionary). Business Dictionary interprets *occupational safety* as “the health and wellbeing of people employed in a work environment” and thus shows that in certain contexts, for example, in the business environment, the terms *occupational health* and *occupational safety* can be interchangeable.

In this study, the terms *OHS training* and *safety training* are often used to denote the same thing. Phelpstead and Neasham (2013: 66) define *training* in the context of health and safety as “the planned, formal process of acquiring and practicing knowledge and skills in a relatively safe environment”. In this study, an *OHS training*, or a *safety training* means an organised activity, or a series of activities for employees aimed at promoting occupational health and safety and reducing incidents and occupational injuries.

1.2 Case Company Background

The case company of this study is GEA Refrigeration Rus, an affiliate company of GEA Group, which is a global machine-building corporation. GEA Refrigeration Rus offers a full range of refrigeration industry services including design, manufacturing, delivery, installation and maintenance of refrigerating units for food, chemical and oil and gas industries. The company is based in Moscow, Russia and has three main lines of activity: 1) Sales of products and services with offices in Moscow, Ekaterinburg and Vladivostok; 2) Service and support across Russia; 3) Assembly plant in Klimovsk, Moscow region.

For the purpose of this study, the assembly plant in Klimovsk was chosen. It is the only production facility of the case company and establishment of OHS practices there is of high priority for the management. Being a separate subdivision of the case company, the assembly plant was launched in March 2015 with all new machinery, amenities and new staff. Refrigerating and gas compressor units for the oil and gas and chemical industries are assembled there.

The assembly plant is an example of an enterprise involved in localising the manufacturing of machinery and equipment in Russia. Localization has become a solution for GEA since it has recently become costly for its Russian customers to purchase machinery and equipment from abroad. Import substitution in Russia makes localization a challenge due to the difficulties of finding reliable parts suppliers in Russia. Nonetheless, the case company has plans to expand the present plant capacity, since potentially there are many products that they are prepared to localise in Russia. Currently, the units are assembled in compliance with the exact specifications depending on the client's request. The staff working at the assembly plant consists partially of own employees and partially of contractors' employees. Table 1 below shows the distribution the company 'blue-collar' professions at the end of 2016, together with their employment status.

Table 1. Klimovsk assembly plant employee data at the end of 2016.

	Profession	Number of employees	Employment status
1	Mechanic	11	4 employees, 7 contractors
2	Welding operator	5	3 employees, 2 contractors
3	Wireman	3	1 employee, 2 contractors
4	Electrician	2	Contractors
5	Painter	2	Contractors
6	Auxiliary worker	2	Contractors
7	Other professions	8	5 employees, 3 contractors
8	Management and supervisors	8	7 employees, 1 contractor
	Entire plant	***41***	***20 employees, 21 contractors***

Although the welding operators do not make the biggest number of employees in the company, as seen from Table 1 above, this profession is notorious for various safety and health risks. When this study started at the beginning of 2016, back then only four people among the managers and supervisors were employees, the rest were contractors. After that, in the course of this study, the occupational data of the case company has changed several times. At the end of year 2016, this proportion changed to fifty-fifty, as seen from Table 1 above.

As the case company is relatively young, over 2016 it has grown by employing those workers who proved themselves as reliable professionals in previous years. These fluctuations in the number of employees can be explained by the fact that the number of people servicing different orders varies, and depends on the size of the order. Small orders can be serviced by the core personnel, while fulfilling larger orders requires more part-time employees to be contracted. In terms of OHS, the case company does not make difference between employees and contractors – all of them receive the same personal protective equipment (PPE), and all must follow the same requirements. However, form the legal perspective, certain differences do exist, mainly in incident management (reporting, investigation, compensations etc.) This study also does not make any difference between the permanent employers and contractors when focusing on safety and training practices.

1.3 Business Challenge

The main business of the plant is assembling different types of compressors. Assembling a compressor from parts and components is a challenging task that requires expertise from several areas. The involved employees face various risks and hazards during the manufacturing process and need to be aware of the safe working practices (SWP). Currently, the employees do not receive a training in SWP resulting in a failure of the case company to ensure health and safety of its employees, as well as causing a violation of the health and safety regulations.

Presently, there is also no structured training programme serving as a standard in the case company, nor the training content itself. Some of the hazards and risks are being discussed during daily shift meetings, some – during the audits done by the assigned OHS professional. However, these discussions do not provide a comprehensive and profession-specific overview of ways to deal with workplace risks and hazards. This, combined with relatively low average working experience of employees on the current site, causes a high risk of injuries and illnesses. If no actions to improve the situation are done, the case company might face a situation where OHS issues will negatively affect quality, efficiency and productivity. It can be seen as a threat for the reputation of GEA Refrigeration Rus and result in legal prosecution.

1.4 Objective, Outcome and Scope

The objective of this study is *to develop a training in SWP and a corresponding training programme for welding operators.*

Training in SWP is a profession-specific type of training. The thesis only focuses on the welding operators and this profession was chosen due to the following reasons. First, welding operators are the second most numerous profession at the assembly plant, there are five of them in the permanent staff. Second, the case company plans to expand manufacturing which will mean engaging new personnel of this essential profession who will definitely need a training in SWP. Third, the case company considers welding operators to be the most hazardous occupation on site, which highlights the priority of training development for them. However, both the training content and the training programme needs to be easy to modify in order to develop trainings in SWP for other professions. By developing the training and the training programme, the goal is to set a standard for training in SWP provision at the assembly plant.

The outcome of this study is a proposal of a training programme in SWP for welding operators and the corresponding training content. This proposal aims to improve safety in the case company and is done as one example to the management of the company of what steps can be taken to improve safety in the case company operations. This proposal, when fully implemented, would also give a good start to a comprehensive approach towards a better communication of SWP in the case company.

The study is written in six sections. Section 1 is the Introduction. Section 2 describes the method and material used in this study. Section 3 discusses best practice on safety training programme development are reviewed, as well as the best practice regarding the contents of the training. Section 4 includes the current state analysis made at the case company by interviewing the stakeholders to understand the safety situation on site and the way new employees are handled. Section 5 moves on to building a proposal of the training programme combining the information received in section 3 and 4, and by conducting a workshop with the case company leadership and scrutinising regulatory and benchmark documents. Section 6 describes the training implementation in the case company, discusses the final proposal based on the feedback and gives recommendations.

Finally, Section 7 contains the summary of the study and discusses the managerial implications that the study has generated. It also ponders on the outcome vs. objective and discusses the relevance, reliability and validity of the results.

2 Method and Material

This section provides an overview of the research design and research process. For this purpose, it describes the research approach, research design, data collection and data analysis.

2.1 Research Approach

The research approach used in this thesis is a qualitative case study. Baxter and Jack (2008:544) give the following definition of the case study approach:

> *This qualitative case study is an approach to research that facilitates exploration of a phenomenon within its context using a variety of data sources. This ensures that the issue is not explored through one lens, but rather a variety of lenses which allows for multiple facets of the phenomenon to be revealed and understood.* (Baxter and Jack 2008:544)

Yin (2003: 8-14) states the four conditions that help to distinguish between different research methods: 1) the research questions this method covers, 2) whether it requires control of behavioural events or not and 3) whether it is narrowed down to contemporary or historical events. Based on that, the author concludes that a case study focuses on answering the “how” and “why” questions, it examines contemporary events and the researcher has little or no control over these events. The method of a case study was chosen for this report because, first of all, aiming at achieving its objective, it explains “how” and “why” the safety training process is arranged. Secondly, it only relies on the current events and lastly, the researcher cannot manipulate them.

Baxter and Jack’s definition of a case study is complemented by Saunders, Lewis et al. (2009: 146-155) who claim that the data collection techniques used during the case study research may be various and used in combination. This multiple source data usage is called triangulation and aims at reinforcing research findings within a study. In this study, several sources of data are used: interviews with stakeholders, company documents and benchmarks.

With the case study approach, Baxter and Jack (2008: 545-546) insist on defining a unit of analysis, i.e. a particular object/phenomenon which the study addresses. They also stress the importance of “binding the case” – indicating the research boundaries for what will be included in the study, and what will be excluded. These boundaries define “the

breadth and depth of the study" (Baxter and Jack 2008: 547). In this thesis the safety training process is analysed in the case company context. Moreover, it is reasonable to examine only the way new employees are handled, and training development is limited to one profession – welding operators.

2.2 Research Design

The research design presents the phases that need to be completed in the study. This study has the research design in the form of a flow-chart that is comprised of 5 consecutive phases, each of them with a goal, a data source and an outcome. The research design is presented in Figure 1 below.

As shown in Figure 1, the first phase of this study is to identify the research objective. The business challenge is selected from the several problematic areas in the field of OHS management that the case company has and plans to work on. Critical importance of employee safety training is the reason why the study is narrowed down to this topic, and in this regard the objective was formulated as developing a training in SWP and a corresponding training programme for one profession (welding operators).

In the second phase, two conceptual frameworks are created based on the best practice suggestion found in the relevant literature. The first framework synthesises development ideas for a training in SWP programme, and the second one – for the training content. The third phase consists of the current state analysis and data collection based on the information from internal documents and interviews with stakeholders. Analysis of this data leads to 1) a description of the current safety situation on site and the way new employees are handled in so far as it relates to their health and safety, and 2) a summary of strengths and weaknesses of the current safety training practice.

The initial proposal of the training programme is created in the fourth phase of this report in collaboration with the workshop participants. Along with that, external benchmark documents and expert opinion from the case company employees served as data for developing the training content. During the fifth phase, the proposal is validated by conducting a training in SWP with all the welding operators. Finally, based on the feedback on training implementation from the key stakeholder, the final proposal is formulated.

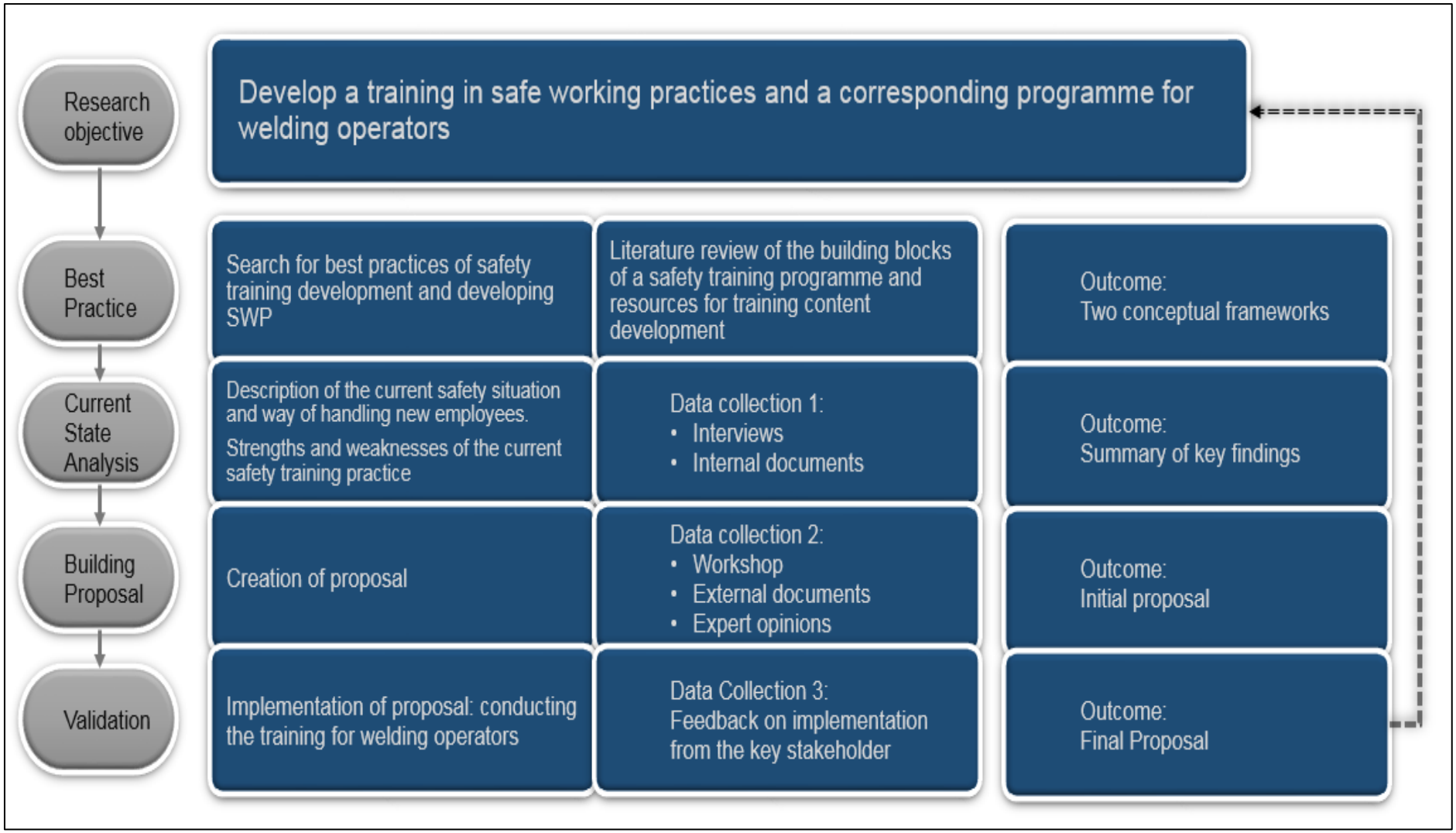

Figure 1 Research design of this study

2.3 Data Collection and Analysis

Data for this study is collected in three different stages: in Data collection 1 by conducting interviews and studying existing corporate documentation, in Data collection 2 by collecting ideas in a workshop, from external documents and referring to an expert opinion. Finally, Data 3 is collected in a feedback session with the case company key stakeholder, which is dedicated to the training implementation. Different data collection methods are shown in Table 2 below.

Table 2. Data collection steps in this study.

Data	Purpose	Data type	Data source
Data 1 Section 4	Understand training practices in different departments and identify strengths/ weaknesses	3 interviews with stakeholders	Blank section foreman Mechanical assembly shop foreman Safety manager
		Internal documents	Reporting structure Operation process chart Production areas workflow Job description Training flowchart Safety guidelines
Data 2 Section 5	Building the proposal: training programme	A workshop with stakeholders	Plant director Foremen Safety manager
	Building the proposal: training content	External documents	Russian safety regulations Benchmark documents
		Expert opinions	Chief welding operator, mechanical assembly shop foreman, safety manager,
Data 3 Section 6	Validating the proposal	Feedback session on training implementation	Safety manager

As shown in Table 2, data was collected in different ways, such as interviews, internal and external documents, seeking specialist's opinions, as well as a workshop and a meeting. Data collection was followed by data analysis, which was conducted using qualitative data analysis. More information on the analysis of different types of data can be found in the sections, mentioned in Table 2. This section proceeds with the explanation of the different data sources.

Interviews

As seen in Table 2, Data collection 1 starts with interviews. Data 1 was collected in April and May 2016. Three company employees were interviewed, two foremen (first-line supervisors) and a safety manager (key stakeholder). They represented 7,5% of the total

workforce of the company as of the time the interviews were held. All of the interviewees had been in the company for just over a year, but considering the age of the organisation, they are from among the pioneers. One potential respondent refused the interview due to being busy with responsibilities. On the whole, involving people to participate was challenging, since the researcher is not an employee of the case company, and the importance of their input to this study might not have been fully communicated to them. The safety manager was chosen since she is the key stakeholder and responsible for safety trainings, her opinion and decisions on safety matters are decisive in the company and therefore play an important role in shaping the new proposal. The blank section foreman was chosen since he has a lot of experience in the industry and as a supervisor. The mechanical assembly shop foreman was chosen because the welding operators work under his supervision.

In qualitative research, the researcher can conduct his or her interviews in various ways: face-to-face with participants, remotely (i.e. via phone call) and in group discussions, all of them aim at obtaining data and information that cannot be obtained via direct observation, such as the background of an activity or clarifying certain behaviour. (Creswell 2003: 186-188).

In this study, due to the fact that the researcher is located in Finland and the interviewees work in Russia, all the interviews and discussions were conducted via Skype. In order to collect in-depth insights on the current state of training practices for new employees, the interview questions were designed for an open-ended one-on-one Skype discussions. It enabled the respondents to share as much information as they wanted to in terms of their views, attitudes and everyday practices regarding new employees. All the interviewees were sent a question template in advance, and were asked to review the interview transcripts. The interview template that was used is attached in Appendix 1. In case with the safety manager, the interview was adjusted and some additional questions were asked according to her competence. It allowed to obtain a broader overview of safety attitudes in the case company. Although only three interviews were conducted, they provided a deep insight into the situation the company is currently in.

Documentation

Documents study is another data collection type this report applied. According to Creswell (2003: 187-188), collecting documents allows the researcher to gather some already existing and approved content relatively fast, as well as to gain an insight into the terms and keywords that are used in the business.

This study included scrutiny of documents in two phases. Firstly, internal documentation was reviewed for Data collection 1 and second, external documents were studied for Data collection 2. In Data 1, in addition to interviews, internal documents were also used as data sources for the current state analysis. In fact, a review of internal documents preceded the interviews. The documents selected are the ones related to the production process, personnel training and safety. All the information was received directly from the case company employees. Table 3 below provides a list of all the documents reviewed for this study.

Table 3. List of internal and external documents.

Document name	Document type	Size
INTERNAL DOCUMENTS (Data 1)		
Production structure - 2	Plant reporting structure	1 p
Production_areas – 19 06 2015	Factory layout	1 drawing
Visio-Operation process 17.05.2016	Operation process charts	5 p
Visio-Workflow 17.05.2016	Production area workflow	3 p
Welding operator job description	Job description	3 p
GEA_Trainings	Personnel training flowchart	1 Excel spreadsheet
Induction training - employees	Internal presentation	22 slides
IOT 02-2016. General safety requirements	Safety guidelines	7 p
IOT 03-2016 Interaction between pedestrians and vehicles	Safety guidelines	7 p
IOT 04-2015 First aid treatment	Safety guidelines	25 p
IOT 09-2016 For welding operators	Safety guidelines	18 p
EXTRENAL DOCUMENTS (Data 2)		
Decree of the Russian Federation Ministry of Health and Social Development dated January 13, 2003 No.1/29.	Occupational safety regulation	
National standard GOST 12.0.004-90	Occupational safety regulation	
National Standard GOST 12.0.003-74	Occupational safety regulation	
National Standard GOST 12.3.003-86	Occupational safety regulation	
Indg297.pdf "Safety in gas welding, cutting and similar processes"	Safety leaflet	11 p
L6.pdf "Cylinders in fire"	Safety leaflet	4 p
TIS8.pdf "Information for customers collecting gas cylinders. Revision 2: 2015"	Technical information sheet	2 p
TIS12.pdf "Handle gas cylinders safely. Information for customers handling gas cylinders. Revision 2: 2015"	Technical information sheet	2 p
LEWeldingSafetyPhotoHunt	Photo task on welding safety	12 p

As shown in Table 3, the internal documents reviewed for Data 1 come from different categories. Some describe the production cycle, some are internal safety guidelines and some are related to safety trainings. They were selected for the purpose of this report to

provide a comprehensive picture of the current ways of working and to understand the company status quo with safety trainings.

Also, as seen in Table 3 above, external documents were used in Data collection 2. External documents served as data for further development of training content, which is one of the stated objectives of this study. The following types of documents fell into this group: occupational safety law of The Russian Federation related to safety training development for welding operators and benchmarks (safety leaflets, technical information sheets and a photo task). The safety leaflets were borrowed from the official site of the national regulator for work-related health and safety in Great Britain – *The Health and Safety Executive (*The Crown 2017*).* The technical information sheets were collected from the official site of *The British Compressed Gases Association*, the UK's trade association for companies in the industrial gases industry (British Compressed Gases Association 2017). The reason for using the UK solutions in the same field as benchmarks for this study is the fact that the British health and safety system is outstanding and even one of the best in the world. According to the *European Agency for Safety and Health at Work*, "Great Britain has one of the best combined health and safety records in the world" and the British health and safety system has a long history and time-proven efficiency (EU-OSHA | An agency of the European Union 2017). The last document mentioned in Table 3 is a photo task on welding safety borrowed from *The Lincoln Electric Company*, an American global manufacturer of welding products. On their official site they share some practical materials on welding safety and this study finds them useful for the training content (The Lincoln Electric Company 2017). All of the abovementioned benchmark documents contain some ideas which cannot be found in the Russian sources, and they add to the optimal solution building for the case company.

Workshop

For Data collection 2 the study of external documents was followed by a workshop, the goal of which was to collect ideas for the training programme proposal. The plant lead team, the total 6 of its members, were participating in the workshop which lasted for 80 min. A set of questions was prepared in advance to serve as a core structure for the workshop. However, some of the topics needed further expansion and the participants felt free to express their thoughts. The researcher took notes and the workshop was recorded. Later on this data was analysed by categorising the comments into different topics related to training development and by comparing them to state regulation on organisation of occupational safety trainings. Some responses were generalised, and

some irrelevant data was discarded. All notes from the workshop are attached as Appendix 2.

Expert opinions

Another useful source in Data collection 2 was expert opinions. It was gathered in the course of proposal building when the researcher interviewed the case company employees, seeking advice on some practical issues. Experts, in this context, are the employees who know the production process very well and their knowledge can contribute to creating the content of the training – the safety manager, the mechanical assembly shop foreman and the chief welding operator. They were contacted by means of telephone or emails.

All data documented in textual format was analysed using thematic content analysis as the method of qualitative data analysis.

3 Best Practice on Safety Improvement through Training in SWP

This section reviews the existing literature on the subject of safety improvement through training. To this end, this section starts with defining a training in SWP as a key measure in safety improvement. Then it discusses available knowledge on safety training programme development and best practice regarding the contents of training, on the example of SWP for welding operators. Based on that, two conceptual frameworks are constructed that are later applied for proposal building.

3.1 Defining a Training in SWP as a Key Measure in Safety Improvement

There is a variety of ways to improve occupational safety, for example, developing a hazard prevention and control system, conducting effective incident investigations and administering a medical surveillance programme. Another key measure to minimise the number of occupational accidents and to improve safety is through education and training. (Mercurio and Roughton 2002) Phelpstead and Neasham (2013: 66-67) refer to training in the context of health and safety as “a key component of competence”, which means that competences are developed and tested in the course of training. The researchers highlight that without training, employees would perform their jobs based on what they think is safe, or what they see as fit. This includes using unsafe working practices, which is not in the employers’ true interests in the end. For this reason, safety training is a legal requirement in many countries. (Phelpstead and Neasham 2013: 66-67)

One can say that safety improvement can be attained through punishment and enforcement of compliance to regulations and warning signs. But that is not true. Alli (2001: 114-116) explains the importance of safety training by the fact that warning signs and control measures cannot prevent workers from unsafe behaviour, unless they understand dangers and realise the necessity of safety measures. In this connection, the information communicated to employees during training sessions needs to compatible with their technical competence and range of responsibilities. (Alli 2001: 114-116) In the same manner as safety improvement does not solely rely on training, safety trainings are most effective when they are not treated in isolation, but integrated into daily work procedures on site. Learning is not restricted to classroom environment and training session timeframe. Sometimes it can take a supervisor just a few minutes to efficiently

convey a certain message to employees. (Alli 2001: 53; Mercurio and Roughton 2002: 268)

Out of different kinds of safety trainings at the enterprise level, this study focuses on the training in SWP. Thus, it is necessary to clarify exactly what is meant by a training in SWP. In accordance with Russian regulations, a training in SWP is provided for all employees within 1 month of starting in the position. The following categories of employees are required to receive the training: new employees, employees who took time off for over 1 year and those transferred to another job. Training delivery method is traineeship. A traineeship combines formal training, tutoring practice and assessment and lasts 2 to 14 working shifts. (National standard GOST 12.0.004-90; Decree No.1/29) Therefore, in most of the cases it is an individual training or training in small groups, specifications of which are to be determined by the employer.

It is also crucial to mention, what a training in SWP is not. It is not an orientation training, since basic safety induction is usually be completed by employees before they start their jobs and proceed to workplaces. Nor is it a professional training, since having professional competence is a prerequisite for employment. To summarise, a training in SWP in the context of Russian labour requirements is a profession-specific training for new to the workplace employees, outlining standard SWP and involving traineeship.

3.2 Building Blocks of a Safety Training Programme

A training in SWP is a type of OHS trainings. This study proceeds from the fact that in general OHS training design follows the same structural logic. Specifically, all OHS trainings can be developed using the same pattern, however they would differ in their content. Buckley and Caple (2007: 28-29) present a basic model of a systematic approach to training. This model is illustrated in Figure 2 below.

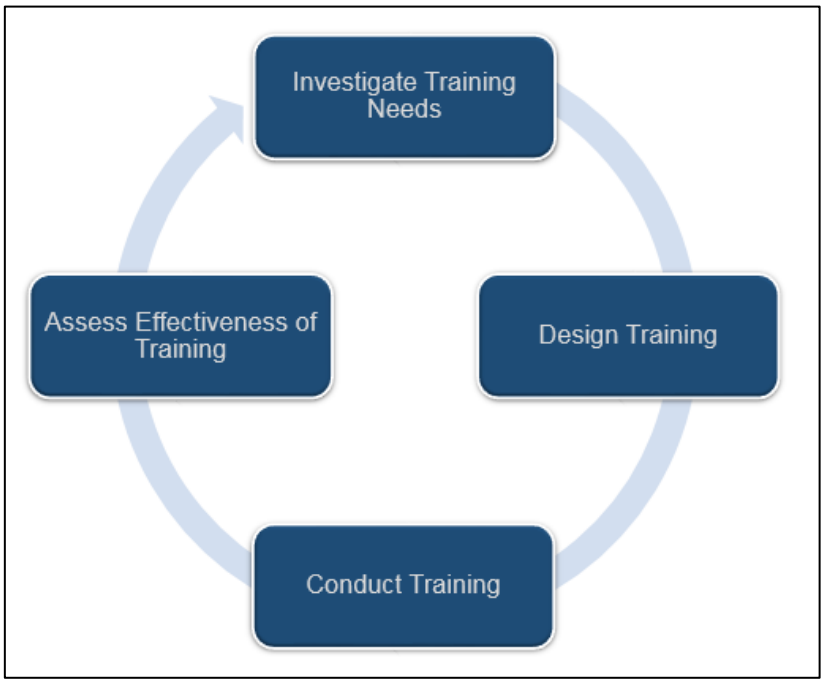

Figure 2 A basic model of a systematic approach to training (Buckley and Caple 2007: 28-29)

The model in Figure 2 above represents four basic stages of training programme development in a sequential order. Assuming that no training exists at all, the first step is to investigate training needs, then to design the training, conduct it and assess its effectiveness. However, one can start from any other point in the model depending on the status and nature of the training project. Naturally, these steps are likely to have variations, but for a training to be effective, at least these four activities are necessary. Following this logic, Section 3.2.1 discusses the training planning stage, Section 3.2.2 observes the training delivery techniques and activities, and Section 3.2.3 examines the post-training execution stage. Section 3.3 focuses on the practical contents of the training in SWP.

3.2.1 Planning a Safety Training

Any training programme starts with planning. Safety trainings are not different in this respect. As reported by Mercurio and Roughton (2002: 266), in order to reach the goal of improving safety through training, one needs to plan how safety improvement will be quantified, for instance, what the trainees will be able do to after successful completion of the training. In other words, an effective training is results oriented and targets measurable objectives.

According to Cekada (2011: 28), Mercurio and Roughton (2002: 269-275), Phelpstead and Neasham (2013: 68), the first step of the safety programme planning stage is identifying training needs. Cekada (2011: 28-29) states that determining the need for training means deciding whether the training is the right solution to the workplace problem. She gives an example of what can happen if the organisation does not conduct training needs assessment or does it ineffectively. As a result, a company might think that the training serves its purpose, while in reality another solution could have been more effective to tackle the problem. Cekada (2011: 30-33) refers to Barbazette (2006) who presents a tool for training needs assessment. It consists of answers to five questions, which are presented in Table 4 below.

Table 4. Training needs assessment tool (Barbazette 2006. Cited in: Cekada 2011: 30).

1	Why	Is there a performance deficiency in the workplace? How do we know this? What data is this deficiency tied to? Even if now performance deficiency exists, are there expected changes in the workplace that may impact performance?
2	Who	Who is involved in the performance deficiency? If there are expected changes in the workplace, who else would benefit from the training?
3	How	How can performance deficiency be corrected? Can training improve this performance deficiency?
4	What	What is the best way to perform this specific job task? Does the employee have the skills and this knowledge? What are the critical tasks that have the potential to produce personal, property or environmental change?
5	When	When should training take place so that it provides the most benefit to the employee and has the least impact on business operations? What format is most effective? What else is needed to make the training successful?

This questionnaire involves employees from all levels of organisation – floor level employees and their supervisors to safety professionals and management. The tool presents a holistic approach to training needs assessment and highlights the equal importance of all the questions. Some questions are easy to answer, while others require some pondering and analysis. Discussing the amount of time needed to conduct a training needs assessment, Cekada (2011: 32) points out that it depends on organisational needs, resources, amount of time available and management commitment.

Jensen (2005: 27) suggests a different method for training needs assessment. He recommends that once the company answers the question about the original intent of the training programme, a goal statement can be formulated. This goal statement declares the reasons to conduct training and determines all further steps of training development. (Jensen 2005: 27). Gudmundsson (1996: 9) claims that the reasons for establishing a

safety training usually fall into two groups: to comply with regulations and to reduce injuries and lost time. On the whole, either of the discussed approaches can be utilised to determine safety training needs, as well as a company-tailored combination of them.

Once the needs assessment is done, the next crucial step is defining the expected outcome of the training, i.e. learning objectives. This step focuses on the trainees' perspective and outlines what skills, knowledge, abilities, motivation or behaviour they should gain or master as a result. (Jensen 2005: 27-28). Buckley and Caple (2007: 116) explain that objectives need to be written and they serve as a means to evaluate and validate training; in addition, they facilitate decisions on method and content of training and provide the trainees with clear target. Gudmundsson (1996: 9) elaborates that a safety training is likely to be successful if it aims at changing employees' skills and behaviour, but not attitudes. Attitudes include certain aspects that an employer simply cannot control, such as the person's background or conflicts with co-workers, while behaviours and skills can and must be taught. Indeed, changing attitudes is a difficult outcome to achieve during a standard training, but it can finally become possible in combination with some other methods, such as: 1) high impact interventions, for example pictures of serious injuries caused by failure to comply with safety rules; 2) enforcement of safety rules which helps to develop a practice into a habit; 3) consulting workers and involving them into the decision-making process. (Phelpstead and Neasham 2013: 60) All in all, setting clear and accurate objectives for a safety training enables management and training developers to further evaluate its effectiveness, trainers – to adhere to the initial intention and remind the trainees what they are expected to be able to do at the end of their training.

The next step in safety training development is to create the training content and to specify learning method and learning conditions. The training content development stands for creating materials that are relevant to the specific training subject, and this topic is covered in Section 3.3. When it comes to learning method, Gudmundsson (1996: 9) describes it as an essential arrangement for the training outcome to be achieved. If the training outcome is to develop a certain practical skill, a classroom might not be the right setting to do that. Apart from classroom training, other examples of learning methods are on-the-job instruction and computer-based training. Every method possesses its advantages and disadvantages. In this study, it is relevant to discuss the characteristics of coaching as a learning method. According to Buckley and Caple (2007: 195), coaching is beneficial in a way that it meets individual needs and allows for constant interaction

between trainer and trainee. As a result, trainee can receive constant feedback. On the other hand, this learning method requires the same time to be spent for one person as for training in a group. Another disadvantage is that training activities might be randomly interrupted by work on hand. In addition, trainer must have both technical competence and skills in coaching which is a rare, but not unattainable combination. At last, trainer and trainee must be comfortable to work in pair. (Buckley and Caple 2007: 195). Analysis of learning methods advantages and disadvantages might help to choose the most suitable one for the particular company context, or to combine them in the most effective way.

Learning conditions of a safety training relate to the physical and psychological factors of training performance. The premise where the training is conducted needs to have adequate ventilation and temperature, comfortable seats and good lighting. Meanwhile, psychological factors depend on the trainer, whose crucial challenge is to keep trainees motivated throughout the course and build up a cooperative spirit between participants. (Buckley and Caple 2007: 145-148).

3.2.2 Safety Training Delivery Techniques and Activities

This section gives an overview of practical tips on training delivery techniques and activities used in the course of a safety training. One of the challenges during a safety training is to make it interesting for participants. Many of the topics are technical and information is often known by the trainees. As a result, the training might get boring and, consequently, inefficient. In order for the trainees to come away with something useful, trainers have to engage them. There are some best practice solutions or “productive applications” on ways to get adults to learn and be inspired. (Hawk 2005: 54)

Tapp (2007: 52) suggests turning the trainee into an active participant by using safety games. The researcher claims that games and enjoyable activities engage employees and create positive emotions which lead to learning getting increased. If the trainee uses intellectual activity, physical movement and all the senses in the process of learning, its effectiveness can considerably grow. In Tapp’s study this concept is called BEE-B (body, eye, ear and brain). Using the body is crucial when learning most of safety-related skills, for example, during a chemistry class. The eyes are commonly used to look at slides or videos. Trainees use the ears to listen to the trainer, videos or each other. Brain or intellectual activity is something which connects all the pieces of information, processes and

stores the new material for future use. An example of using this concept in class is the game called PPE Partners. During a hand safety training, trainees are divided into groups and asked to match different types of gloves with products or objects these gloves are appropriate for. All the gloves and products or objects are placed on a table in the classroom. The teamwork is followed by explanations and a discussion. To sum up, this game involves movement, sight, hearing and intellectual activity, being at the same time educating and challenging. (Tapp 2007: 52-54)

This interactive approach towards safety training provision is supported by Von der Porten (1996: 32-33) and his case analysis. According to the researcher, the case company in his study has low injury rate, and the key to this success is a technique called Safety Quiz. It is used instead of a traditional safety training to remind employees of company safety procedures and consists of 15 questions, randomly compiled from the question bank. Employees are given a two-weeks' timeframe to complete the quizzes, but the rule is "discussing this with other employees is allowed, but the discussions must be on the general ideas being questioned. Discussions only to obtain an answer are not allowed". Thus, employees are encouraged to use their auditory channel to learn by discussions, visual channel to learn by reading or kinaesthetic perception to learn by handling, feeling or doing. (Von der Porten 1996: 32-33)

In the same vein, Hawk (2005: 54) encourages to use the three practices which proved to be most productive in his experience with safety trainings: getting people involved; using less text and more pictures; and experimenting. By getting people involved the researcher means making people support and participate through being part of something interesting and important. To achieve this, the trainer can use stories, questions and comments from the students in the course of training. Showing images instead of slides with text during a presentation, giving vivid examples touches people emotionally, facilitates interaction in the class and, as a result, impacts learning. It is highlighted, that examples make ideas sound specific and personal. One can tell about a witnessed safety accident or situations when an accident was prevented due to some tool or correct behaviour. (Hawk 2005: 54-56)

3.2.3 Post-training Execution

The next logical stage after the training has been conducted is to determine its effectiveness. Training evaluation enables the trainer to receive valuable feedback and improve

the programme, update the contents and achieve better results next time. Methods for evaluating a training course are vastly described by Kirkpatrick (1996) and he groups them into four categories: 1) reactions of the trainees, 2) learning, 3) behaviour change and 4) results. The first category implies that trainees complete a rating form at the conclusion of the training and evaluate, for example, whether the training was useful and how it can be improved (Kirkpatrick 1996). Machles (2003: 56) argues that this type of evaluation is only applicable if the training will be repeated again and trainees' perceptions can be used to make improvements or adjustments to the next class. Otherwise, the researcher claims, one-time classes are not worth evaluating.

The second type of evaluation measures learning. It defines to what extent the trainees increased knowledge or skills, depending on the training objectives. It is therefore relevant to evaluate trainees' level of knowledge or skill before the training, and then compare it to the one after the training. (Kirkpatrick 1996). In this connection, Jensen (2005: 29-30) outlines one more element in training programme development: deciding whether pre-training evaluation data will be collected or not, and in case the company chooses to do so, obtaining this data. According to the researcher, the decision should be made in the planning stage, and the method of data collection depends on the learning objectives. It can be a quiz, documented behavioural observations or safety performance indicators. Returning to evaluation of knowledge gained or skills required, Machles (2003: 58) gives an example of how to effectively use this method. He suggests creating a situation which employees are most likely to face in real working life, specifically, if it was a forklift training, asking employees to demonstrate their skills using a forklift. The researcher concludes: "Have the participants perform, and you will have a better understanding of the actual learning that took place".

The third category of methods is aimed at measuring behaviour changes. The purpose here is to examine whether the training reached the point where it gets transferred to the workplace and employees start behaving differently (Kirkpatrick 1996). Training transfer, being one of the essential principles of learning, is determinant for this study in general, since any safety training is only relevant if it can be further transferred into practice. Proceeding with behaviour change, Machles (2003: 61) points out that it might not be easy for the trainer to evaluate whether a shift in employees behaviour took place or not, unless he has some control over workplace safety. Otherwise, the researcher continues, it is good to have supervisors and co-workers with proper skills involved in the evaluation.

The forth type of evaluation is measuring the results which occurred due to training. This is the highest level of evaluation and it deals with overall impact of training (Kirkpatrick: 1996). Related to safety, the examples of performance indicators are injury and incident rates and statistics of compliances vs. non-compliances (Machles 2003: 61; Jensen 2005: 29). The majority of researchers highlight the difficulties that might occur when attributing results to a particular training; moreover, change can be triggered by other activities and contributing factors (Machles 2003: 61; Jensen 2005: 29; Robotham 2001: 34). Crucefix (2001: 98) summarises Kirkpatrick's four-level model of evaluation in Table 5 below.

Table 5. Criteria and methods for measuring the effectiveness of training programmes (Crucefix 2001: 98).

	Criteria	Method
1	Reaction of trainees to quality of instructor, relevance of content, time allowed	Questionnaire to gain opinions, perceptions or attitudes
2	Learning what has taken place in the training course.	Pre/post training comparisons (oral/written quiz)
3	Behavioural changes: transfer of skills to job	Observations by supervisor. Demonstration/use of skills gained
4	Impact of training. Comparison of course goals against results achieved.	"Soft" measures such as climate surveys of attitudes towards safety. "Hard" data: safety record/injuries and losses

.

As seen in Table 5 above, criteria for training evaluation are derived from the learning objectives and training frequency. Evaluation can be relatively simple to conduct, as in case with questionnaires, or it can require a lot of analysis and consume time and people resource. Either one or several methods of evaluation can be applicable to one and the same training.

The outcome of the assessment stage reveals the need for making improvements in the safety training in case it will be repeated. Jensen (2005: 30) argues that improvements can affect training materials, facilities, topics coverage and assessment tools.

Once the training is over, it is important to ensure that new skills and knowledge get transferred into work. It does not happen automatically, even the best training with most impressive delivery and examples might only have a temporary effect. First and foremost, trainers need to remember about the capabilities of human brain and focus on one topic at a time during the training. In such a manner there will be no information overload and learning will be more effective. For the training to be transferred into daily behaviour, employees need to start using new skills and applying new knowledge right after the training is over. There are several ways to make this integration possible. First, it is the responsibility of supervisors to serve as models when they perform tasks themselves and observe employees to make sure they use appropriate practices. In addition, supervisors need to enforce correct behaviour and support those who comply. Indeed, a supervisor's role is hard to underestimate, he/she is a link between the company OHS policy and his/her crew members, and needs to be knowledgeable about hazards on site, accountable for overall group performance and be able to give effective training, especially to new employees. (Blair and Seo 2007: 46-47; Hecker 2015)

Second, peer observations are useful, with immediate feedback being provided. Third, management needs to be aware of the OHS aspects of their operations, and be held accountable for supporting new behaviours. Next, regular gatherings of a safety committee can be a platform for discussions of problems and improvements. (Atherley and Robertson 2015; Blair and Seo 2007: 46-47; Hecker 2015) Training reinforcement can also be provided through recognition of correct performance and every-day reminders, such as short meetings, posters and notes.

3.2.4 Conceptual Framework 1

Based on the available knowledge and best practice on safety improvement through training discussed above, the building blocks of safety training programme development have been identified and discussed based on the best practice in this field. Conceptual Framework 1 of this study includes three major steps of 1) planning the safety training; 2) selecting appropriate training delivery techniques and activities, and 3) post-training execution. Detailed Conceptual Framework 1 is illustrated in Figure 3 below.

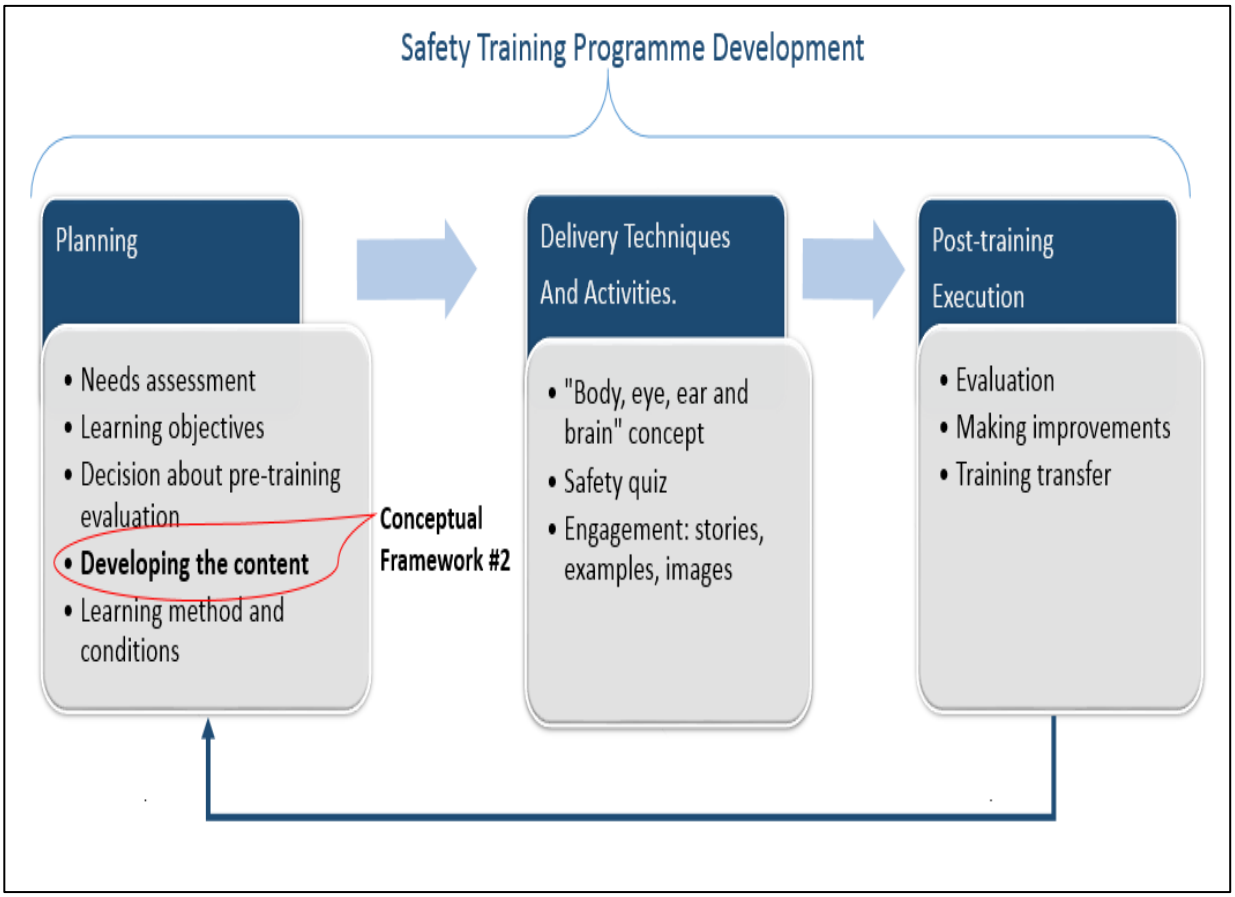

Figure 3 Conceptual Framework 1 of this study.

As seen in Figure 3, Conceptual Framework 1 is presented in the form of a process. This is to illustrate the correct sequence of training components. None of the buildling blocks can precede the one before it. If a new safety training programme is being built, one starts from the planning stage. However, if the programme is ongoing, this conceptual framework can be used in order to review and update it, and therefore, one can start from any other step. In line with this idea, Mercurio and Roughton (2002: 291) remark that “the next training session will always be better if you learn to accept constructive suggestions”. Each building block in Figure 3 is divided into subcategories – elements of a safety training programme. A combination of these elements works for the overall efficiency of the programme. Thus, the purpose of Conceptual Framework 1 is to provide a holistic approach towards safety training programme development. It is a practical tool that is applicable to any safety-related trainings, professions and number of trainees.

One of the elements of safety traning programme development is working out the actual content of the training material. The training content is directly linked to the training sub-

ject, and stipulates the choice of topics, their organisation and sequencing. Training content has a multiple sources of input. Section 3.3 describes those applicable for developing SWP and concludes with Conceptual Framework 2.

3.3 Training in SWP Content Development

This section analyses in more detail the aspects of business performance and specific documentation which need to be examined in order to articulate SWP.

Literature review does not provide an approach towards formulating SWP which is both logical and appropriate to the application in local Russian realities. The logic of this section is incentivised by the paradigm suggested by Alli (2001: 113-116). The researcher suggests that the responsibility to provide training and information exists at two levels – the national level and the enterprise level. Thus, this section discusses the various sources of input which need to be considered when developing SWP, and which are related to the abovementioned levels.

To begin with, at the national and international level, applicable safety regulations and profession-specific standards are worth to be investigated. ISO standards, for example, provide in-depth information on the technical aspects of various welding processes, including safety rules. With international standards, one needs to verify applicability and check whether the company aims to conform to this standard. Furthermore, companies may adhere to corporate standards and one will find useful references there too. Under all circumstances, there is an obligation to follow national regulations. In case of Russia, for example, the information concerning welding processes and associated risks control is contained in GOST standards and regulations on fire safety (PPB). (National standard GOST 12.3.003-86; Fire safety regulation PPB 05-86) All the above mentioned documents outline essential technical information and serve as primary sources for the development of SWP.

Along with national and international regulatory documents, companies have internal documents which give a more detailed perspective on the operational environment. Firstly, it is an equipment list and a site layout. They provide insight into the size and capacity of the production site, current operational processes and the location of machines, facilities and systems. In connection with SWP, it is important to know, for example, the location of entrances, pedestrian walkways and mobile equipment routes, areas

where hot works are performed and so on. Secondly, there are process instructions, job descriptions and equipment manuals. In addition to those, Article 212 of the Labour Code of the Russian Federation obliges companies to have written safety instructions developed for employees of all professions (Labour code of the Russian Federation 2017). These instructions contain information on safe work performance and workplace-specific requirements. Thus, there is a variety if intercompany sources which can be used to extract safe working practices.

Apart from documents examination, valuable contribution to the development of SWP is made by professionals – workers and their supervisors. It is for them that SWP are developed, so it makes sense to take into consideration their experience and observations. Phelpstead and Neasham (2013: 103) highlight the importance of involving workers into training content development and claim that employees' participation can help them better understand hazards and risks and see the reasons behind SWP. Researchers explain that involvement helps to instil commitment to SWP in employees and add to a positive safety culture. (Phelpstead and Neasham 2013: 103)

Next, while developing safe working practices, it is helpful to look at some materials already in existence, for example, the ones available from training providers or safety associations. External materials can add some vividness and diversion, as well as useful safety reminders which might not be covered in documentation. A reliable source of practical tips on SWP for different industries is the official site of The Health and Safety Executive (HSE), an executive non-departmental public body of the United Kingdom (The Crown 2017). European Agency for Safety and Health at Work states that Great Britain has "one of the best combined health and safety records in the world" (EU-OSHA | An agency of the European Union 2017), which explains the reason for using the resources provided by HSE for the purpose of this study.

The development of SWP is closely connected with the formal process of risk assessment. Phelpstead and Neasham (2013: 85) define risk assessment as a "process of identifying hazards, assessing the risk that they generate and then either eliminating or controlling the risk". According to the researchers, risk assessment can be divided into five steps: 1) identifying hazards, 2) identifying people at risk, 3) evaluating the risk and deciding on the precautions needed, 4) recording significant findings and 5) risk assessment review and update. The third step in this sequence includes deciding on appropriate precautions, it can be either removing the hazard itself, or enclosing the hazard in such

a manner that people do not come into contact with it, or creating a safe person through training, supervision and enforcement of safe behaviour. (Phelpstead and Neasham 2013: 88-93). This is where SWP come into the picture. People need to be aware of methods of work which are safe and approved. Therefore, when developing safe working practices, one needs to take into consideration the company risk assessment process.

3.3.1 Conceptual Framework 2

This study has identified a number of sources of input that need to be considered when developing SWP. These contributors form Conceptual Framework 2 as shown in Figure 4 below.

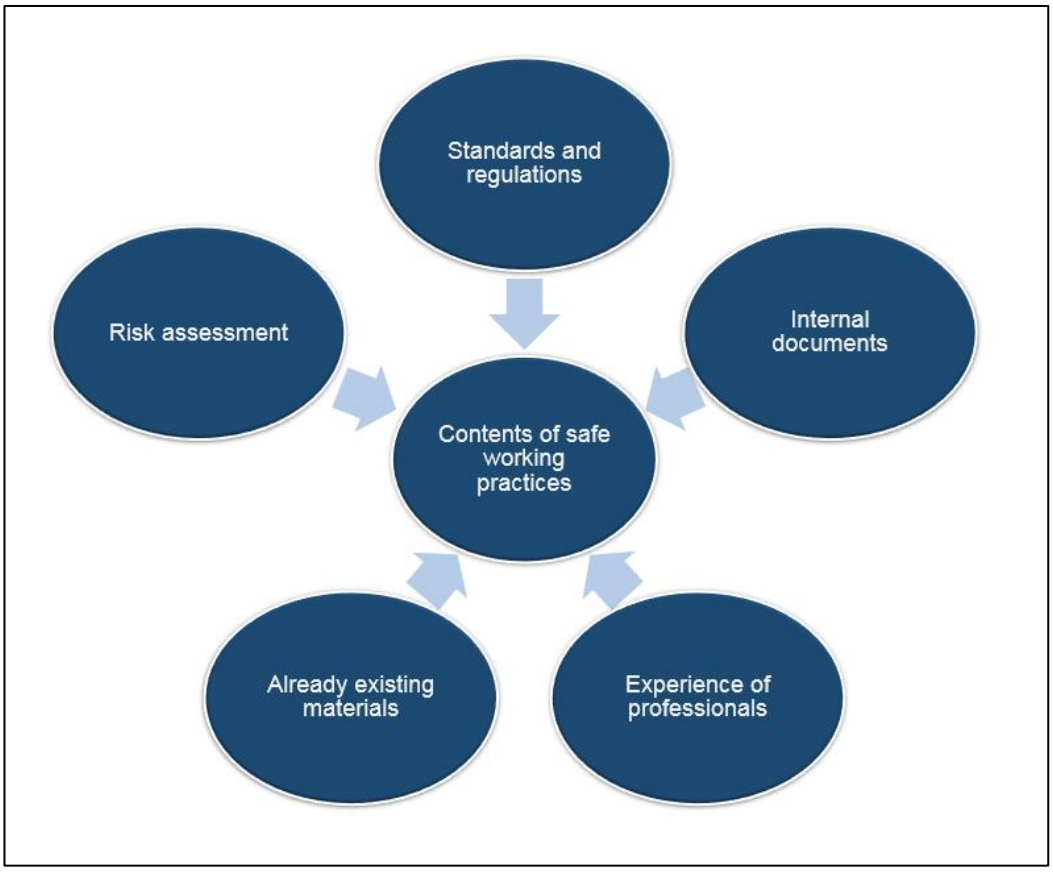

Figure 4. Conceptual Framework 2 of this study.

As indicated in Figure 4, Conceptual Framework 2 is presented in the form of a mind map. Some of the elements are fundamental (standards and regulations, internal documents) and some are the necessary add-ons (experience of professionals, already existing materials, risk assessment). Nonetheless, the mind map illustrates the equal relevance of all its elements and shows that in order to develop truly efficient SWP, all these

resources need to be taken into consideration. For instance, SWP developed only based on documentation might appear unrelated to a particular workplace or profession and boring for trainees. Another example is SWP adopted from already existing materials, such as SWP developed for employees of the same profession at a different company. They might contain mistakes, outdated information or wrong requirements. All this strengthens the view that only careful study and selection from the suggested resources can help to create SWP which will reflect “real life” in the workplace and be easy to implement.

To address the objective of this study, it was necessary to split it into two sub-goals, which explains the presence of two conceptual frameworks. Sub-goal one targets developing a training programme in SWP, while sub-goal two aims to devise the content of the training. Therefore, Conceptual Framework 1 deals with safety training programme development and is further used as a lens to analyse findings from the CSA. This is reflected in the structure of Section 4.3. Conceptual Framework 2 is an extension of one of the elements of Conceptual Framework 1, namely the “developing the content” element of the planning stage. It serves the purpose of developing SWP, which points to the critical role of the content of the training. As such, Conceptual Framework 2 is not referred to in the CSA, because the content of the training is non-existent. However, this conceptual framework is utilised at the proposal building stage.

4 Current State Analysis

This section analyses the current state of provision of training on SWP to new employees of the case company and identifies the strengths and weaknesses of the current safety training practice. First, it gives an overview of the input for the current state analysis (CSA). Next, it discusses the current safety situation and ways of handling new employees in the case company. Finally, it analyses the training on SWP today through the lens of Conceptual Framework 1, and identifies the strengths and weaknesses of the current safety training practice.

4.1 Input for the Current State Analysis (Data 1)

Since the training and the training programme are just non-existent, the focus of the interviews during Data collection 1 was to obtain an overall picture of safety on site, as well as to learn about the ways of handling new employees in the company. Hence are the first two interview topics covered in the template (see Appendix 1). The third topic is devoted to establishing the definition of SWP, which is linked to what the company is aiming to have as content of the training. One of the interviews goals was to conduct training needs assessment, and for this purpose Barbazette's tool for training needs assessment was adopted (Barbazette 2006. Cited in: Cekada 2011: 30). Some of the questions suggested by the researcher were used during Data collection 1, and some – during Data collection 2, which divided the process of training needs assessment into two stages.

Data obtained during the three interviews was analysed through the lens of Conceptual Framework 1. First, the transcribed interviews were read through in order to collect general ideas and compare the answers of the respondents. Second, the chunks of material were divided into two major topics – current safety situation and training in SWP. The second topic was further segmented and the interviewees' words were grouped accordingly. Next, the data within each category was analysed, the most illustrative quotations were selected as evidence. Finally, the data was interpreted based on the respondents' explicit answers and the implicit information inferred from the interviews. The interpretations resulted in a summary of strengths and weaknesses presented in Section 4.4.

4.2 Current Safety Situation and Way of Handling New Employees

Evaluation of safety management system or safety culture in the case company is not the focus of the CSA. However, it is useful for the purpose of this thesis to develop an understanding of the current safety situation which frames the context for safety trainings delivery.

The case company belongs to the GEA Group, however, GEA OHS requirements presently do not apply to the assembly plant in Klimovsk. This means that the assembly plant functions solely under the Russian OHS regulations, no corporate standards are currently applicable. Due to the fact that the plant has existed for less than two years, it is true to say that its OHS system is in initial stage of establishment. Before 2016 there was no full-time safety manager in staff, thus the actual development and implementation of safety rules has only started in 2016, along with the introduction of safety documentation, audits, training and keeping safety records. According to the company documents, no serious injuries or injury-free events have been registered. In view of this, all the interviewees believe that the current level of safety is satisfactory, but they see room for improvement. The following observation of informant 3 reflects typical attitudes to safety on site:

> *<Accidents or near-accidents at the plant> occur because people do not know the requirements or do not follow them. Furthermore, we often have to fulfil tight deadlines for orders, it makes people hurry and can cause mistakes.* (Interviewee 3)

This example clearly shows the lack of attention to safety rules on the part of both floor-level employees and supervisors, manifested in their behaviour. It emphasises the need for safety instruction and training. This brief analysis being done, it can be summed up that the current safety situation at the plant requires improvement and efforts to be taken at all levels of organisation.

In terms of safety training, the current way of handling new employees is illustrated in the following flowchart:

Figure 5. Current way of handling new employees in the case company

As seen in Figure 5 above, having attended a one-hour safety induction training and received the PPE, new employees proceed to their workplaces and start working under a tutor's supervision from the first day. The tutor is either an experienced colleague or the supervisor himself. No specific safety-related prerequisites are stated prior to starting work, except for the two abovementioned. There are recently developed safety instructions in place, describing safety rules for employees of different professions or when doing specific jobs. However, from the interviews with supervisors the actual efficiency of using these written instructions it is not evident.

All other safety information is passed to the employees on an ad-hoc basis. They receive it from colleagues in the form of random reminders, from supervisors as and when necessary and from the safety manager during observations and check-ups. As of May 2016, no other safety trainings, systematic briefings or engagement activities are being conducted at the plant.

4.3 Training on SWP Today

As discussed in Section 1, there is currently no formal training in SWP provided for employees. The fact that the formal training has not been thought of does not mean that employees do not receive any introduction to the site safety requirements at all. In fact, as found from the CSA, employees are to some extent aware of ways to perform their job safely, but there is no set standard of safety performance applicable for all. In order to analyse the current state of training on SWP provision, Conceptual Framework 1 is utilised. The sections that follow correspond to the elements of Conceptual Framework

1. First, they analyse the findings to the planning stage, then move forward to the delivery techniques and activities and post-training execution.

4.3.1 The Planning Stage

It became evident from the interviews, that the case company currently gives precedence to employees' skills over knowledge. This attitude is traced in the hiring policy of the company. Answering to the question about the knowledge and skills in terms of OH&S that the company expects a new employee to have before hiring, the safety manager says:

> *We don't expect anything from him. Some employees might not even have professional certificates with them.<…> Quite often we meet our future workers at the sites of our customers, we see how well they perform, see the quality of their work and then hire them.* (Interviewee 1)

This statement is a pointer that the theoretical component of employee safety training is not a strength area of the case company and therefore calls for improvement. Although employees having no formal qualification are being placed for trainings at the company's cost, employees still do need internal site-specific safety training. Theoretical part of a safety training leads to a deeper understanding of practical rules which employees follow. It helps to see the reasons behind those rules and frames the overall context.

Another finding is related to the way the case company handles its new employees. There is no consistent approach towards this matter among the supervisors. Some of them appoint experienced workers to tutor new employees, others do it themselves. Duration of traineeship is variable and, according to interviewees 2 and 3, can last from two shifts to two weeks. This is how interviewee 3 comments on this aspect:

> *It all depends on the employee. Sometimes an employee learns fast and it will take two shifts. Other employee will be trained for 5 shifts and it will not be enough for him.* (Interviewee 3)

Absence of a formalised training programme leaves most of decisions with supervisors, who interpret their subordinates' needs for training and safety instruction based on own

understanding. This situation inevitably leads to misinterpretations and allows for unequal treatment of employees across work areas and supervisors showing favouritism, as well as omission of critical information and placing workers at risk.

In addition to that, supervisors have insufficient competence in safety training delivery. Currently the supervisors do not provide any official safety trainings to their workers in the case company. Their reticence on questions about new employees' handling during the interviews, in combination with some non-verbal signs demonstrates gaps in knowledge of legal safety requirements and lack of skills and instructional experience necessary for safety training delivery. Although, only two supervisors were interrogated, this view is endorsed by the safety manager (interviewee 1) and applies to the line management in general, as she says:

> *As far as I know, our foremen (first-line supervisors) had previous job experiences in companies, where safety standards were not high enough. So the foremen also need training and instruction.* (Interviewee 1)

Another finding from the interviews is the fact that new employees are not encouraged to prioritise safety. This conclusion is backed up by the following example, given by interviewee 1:

> *I see that employees "fly blind". They do everything to perform assignments as fast as possible, no matter what risks they involve. For example, workers might take care of themselves but totally not care about their colleagues. Imagine, a welding operator starting welding operations and not informing anyone around about it. He has all the PPE on, but his fellow employees walk around in non-fire-resistant clothes and any spark can cause injury.* (Interviewee 1)

Safety-as-a-top-priority attitude starts from commitment to values on the top-level of organisation. The abovementioned example suggests a failure in prioritising safety among the leadership and employees of the case company. New employees naturally adopt the accepted attitude to safety. Safety trainings represent an opportunity to enhance safety culture, as well as to find a balance between safety and production goals and properly communicate it. This is definitely a point for consideration during the training planning stage.

4.3.2 Delivery Techniques and Activities

The only training delivery technique the case company currently uses is tutoring. Tutoring practice has been set up as a logical solution to address the need for passing knowledge and skills to new employees. Although it does not conform any internal regulations, it is a working tool on its own. This is how one of the supervisors (informant 2) commented on his experience with new employees:

> *I also appoint a tutor for him from among the most experienced employees. So the new employee works with a tutor. But in fact it is me who supervises the new employees, I'm around all the time and control works that are being done.* (Interviewee 2)

On the same subject the safety manager (informant 1) also noted:

> *New employees receive necessary safety knowledge and skills from either or both their supervisors and colleagues. Yet we do not have any system or written procedure for that.* (Interviewee 1)

As soon as tutoring is a part of the training in SWP, which is the objective of this thesis, it is regarded as a strength that this practice is already existing. Hence, tutoring is an already established method which helps new employees to become familiar with the location and adjust them to their job tasks.

4.3.3 Post-training Execution

The case company does not carry out any knowledge assessment before employees have clearance to work unsupervised. Formally, employees are admitted to work from the first day of employment. Although tutoring exists, it is an informal practice, and whether or not an employee is ready to work unsupervised depends on the supervisor's perception. Not to mention that it is a violation of local safety regulation, the absence of an approved procedure for impartial knowledge and skills assessment might lead to safety non-compliances and potential incidents.

Refresher trainings are necessary for both new and experienced employees in order to prevent degradation of skills and update with the latest safety requirements. The case company does not yet provide any regular refresher trainings to its employees.

Another point related to post-training execution is training transfer. The development of a training in SWP has the full support from the top management side. This statement is enabled by the fact that this study is done by a third party and sponsored by the company. The management support will be a crucial factor in the training implementation phase.

4.4 Key Findings from the Current State Analysis

Analysis of the data collected through interviews and document reviews reveals that employee safety training is an essential element of building positive safety attitudes and ensuring compliance to safety rules. The results of the current safety training practice analysis revealed both strength and weakness areas. The key strength and weakness areas are illustrated and discussed below.

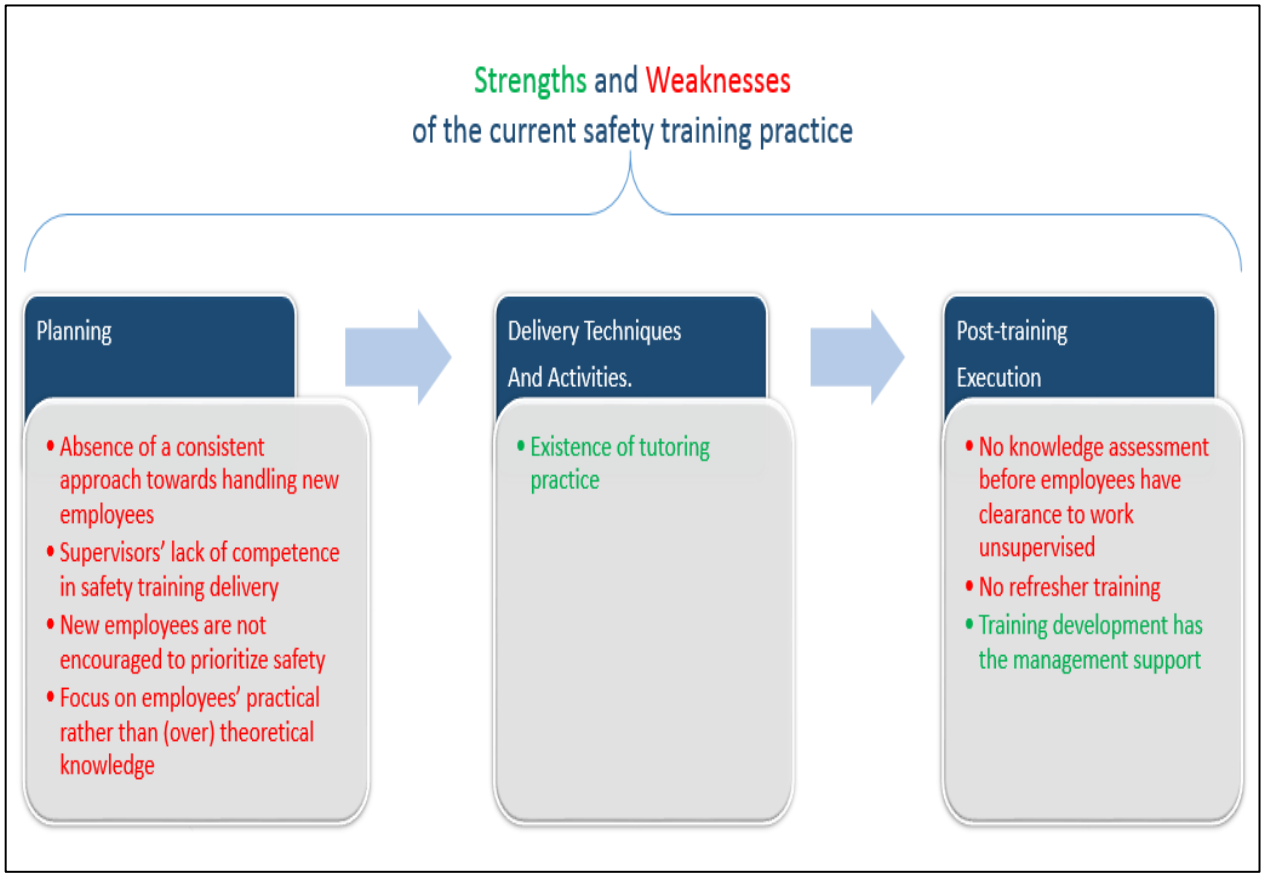

Figure 6. Strengths and Weaknesses of the current safety training practice.

As seen in Figure 6, the strengths and weaknesses come down to seven points in total and they fall into three categories from Conceptual Framework 1. In other words, this summary presents a CSA version of Conceptual Framework 1. The CSA reveals four challenges in the planning stage of training in SWP delivery for new employees. They include: (a) absence of a consistent approach towards handling new employees, (b) supervisors' lack of competence in safety training delivery, (c) new employees are not encouraged to prioritise safety, and (d) focus in employees' practical over theoretical knowledge. Existence of tutoring practice is the only finding in the delivery techniques and activities category, and it is considered as a strength. The post-training execution category has two weaknesses: (a) no knowledge assessment before employees have clearance to work unsupervised, (b) no refresher training and one strength: training development has the management support.

Presently, the assembly plant is in the process of establishing its safety processes and procedures, including those related to safety training delivery for new employees. Findings of the CSA indicate that the accustomed ways of handling new employees have both strengths, which would serve as a foundation for the future system, and weaknesses that need to be addressed.

5 Building Proposal for the Case Company

This section presents the initial proposal based upon the merged results of the two conceptual frameworks, the CSA and Data collection 2. First, it summarises the steps of building the proposal. Second, it provides an overview of findings of Data collection 2. And finally, it describes the proposed training programme for welding operators and the corresponding training content.

5.1 Description of the Proposal Building Process

One of the steps in the proposal building process is defining SWP and ensuring a shared understanding of the phenomenon across the company. The exact definition for SWP is established by the management and first-line supervisors of the case company during the workshop conducted in the Data collection 2 phase. The definition started to crystallise in Data collection 1 phase, and was finalised during the workshop. In this study, SWP are documented methods of work describing ways of carrying out specific tasks in order to minimise risk to people, equipment and environment. They are consistently used in practice.

It is important to notice that SWP do not have a definition in the Russian labour safety regulation. Internationally, the concept of SWP has varying meanings and denominations, that are used alongside with SWP, for example “safe systems of work” (Phelpstead and Neasham 2013: 103) or “safe working methods”. The proposed definition is made simple and linked to what the company aspires to reach with introducing SWP into daily job routine. The definition also distinguishes between working practices that are safe and those unsafe, which is important for the goal of setting a standard for safe work activities.

To build the proposal, first, the existing knowledge on safety training development is reviewed in order to get an idea of what makes a good training programme and what sources contribute to formulating the safe working practices that are effective and truly relevant for the case company employees. Based on the literature review, two conceptual frameworks are created.

Next, the CSA is conducted in the case company in order to reveal the strengths and weaknesses of the current safety training practice. It is revealed that the case company makes use of only one tool to educate new employees on workplace safety and it is

tutoring practice. However, no formal training is being provided, nor there is any consistency in the way supervisors handle their newcomers.

After the CSA, a workshop is conducted to present its results to the case company lead team and receive insights on training programme development. Along with that, documentary materials which were selected to be used in the training content development, are being scrutinised and analysed. Next, this particular process is explained in detail.

5.2 Findings of Data Collection 2

In order to develop a training programme which the case company would eagerly use and be able to replicate for other professions, opinions of process users and stakeholders must be heard. Therefore, in May 2016 a workshop was conducted in the case company. The questions, discussed during the workshop, were structured in line with Conceptual Framework 1 and findings of the CSA. First of all, the definition of SWP was finalised during the workshop, and after that a summary of strengths and weaknesses from the CSA was demonstrated to the participants. Everybody agreed with the presented information. One of the highlights was that the identified weaknesses opened up a wider range of problems with safety in the company. Specifically, what was meant is that apart from new personnel training, which is currently non-existent, there are also other safety management system tools which can address these weaknesses. However, the participants agreed, that a well-rounded training proposal would be able to improve on the weaknesses, provided that it is effectively implemented. This led the discussion on to the stages of training programme development which are presented in Conceptual Framework 1. The participants were encouraged to share their thoughts on the following topics: planning, delivery techniques and activities and post-training execution. Findings from the workshop are summarised in Table 6 below.

Table 6 Summary of workshop results

Stages of training programme development (CF 1)	Workshop suggestions
Planning	
1) Needs assessment & Learning Objectives	Tool by Barbazette (2006. Cited in: Cekada 2011: 30). Both Data 1&2 utilised.
Why *(Data 1)*	Current level of safety on site: “I would say it is satisfactory”. (Interviewee 2) “3 out of 5, so to say” (Interviewee 3) “We are fortunate. My opinion is we’re just lucky not to have any serious incidents”; “I think, the level of our employees’ safety awareness is low and I would like it to raise”; “Overall,

	the level of knowledge of our managers and workers is low. Therefore, there's lack of control over OH&S matters". (Interviewee 1)
Who (Data 2)	It is good to have this training provided to all the employees (Workshop notes)
How (Data 2)	Proper training should make them more aware of safety and impact their behaviour. Everyone is convinced that this training is essential for enhancing safety. (Workshop notes)
What (Data 2)	In fact, all the welding operators do is welding. They do 3 types of welding – argon arc welding, semiautomatic welding and manual welding. The safest method out of the three is argon arc. Semiautomatic and manual welding have more sparks and brighter flash. (Workshop notes)
When (Data 2)	First week after employment (National regulation) Format: classroom training + tutoring practice, 2-3 OH&S topics per day, not all at once. (Workshop notes)
2) Decision about pre-evaluation data	Decided that pre-training knowledge assessment is needed
3) Developing the content	Starting point – internal safety guidelines
4) Learning method and conditions	Optimal training duration – 5 shifts. Lecture format + tutoring practice First the safety manager will conduct the training, later – delegate to foremen. Tutoring – supervisor's function. 30 min training session with presentation.
Delivery techniques and activities	
1) "Body, eye, ear and brain" concept	"I've recently learnt one tool to make an emotional impact on people. It is about role-playing an incident. Asking an employee to act as an injured person and observing the behavior of others. I was told this really works."
2) Safety quiz	-
3) Engagement: stories, examples, images	Presentations should have photos\videos illustrating right and wrong working practices.
Post-training execution	
1) Evaluation	"Since it is a new training for us, we will need to evaluate if it is effective or not, if people embrace it or not."
2) Making improvements	-
3) Training transfer	-

As seen in Table 6 above, the training needs assessment, partially done during the CSA, was finalised during the workshop. The tool by Barbazette (2006. Cited in: Cekada 2011: 30) was employed to answer the five special questions. The case company employees were guided through these questions in order to identify gaps and areas of need. Their answers confirmed that the training the company aims at is really able to address the current deficiencies. Training needs assessment is the first step towards formulating training objectives and starting to develop the training programme.

The plant lead team were substantially unanimous in most of the topics discussed. For example, everyone agreed that the optimal duration of a training session in the classroom should be approximately 30 minutes. It means that the rest of working hours during the shift the new employee needs to be engaged in other educational activities, perform

individual tasks or work under a tutor's supervision. Next, all the workshop participants seemed to understand the value of pre-training assessment and post-training evaluation. However, the question of training duration was rather controversial. One of the foremen argued that the duration of the training should depend on the employee, because "for some a 2-shifts training is enough, for others it would take more than 5 shifts", as he said. A couple of other participants tended to share this view, but in the end, for the purpose of uniformity a 5-shifts-long training solution was accepted. Table 6 has workshop themes mapped on Conceptual Framework 1. But as seen in Table 6, some of the sub-elements, like *safety quiz, making improvements* or *training transfer* were not included in the discussion. To provide valuable insights on these topics, the participants needed some background knowledge, which they did not have, or time to see into that in the course of the workshop, which was also limited. So the researcher decided to come up with own solutions on those topics and test them within the initial proposal. Nevertheless, the last question of the workshop about the level of priority assigned to employee safety in the company, happened to reveal that training transfer, which essentially relies on management attitudes and behaviour, might be an issue if not given special attention to.

Another topic briefly touched upon during the workshop was the development of training content, namely, what SWP are to be included into the training materials. The answer to this question was rather clear for the participants: the internal safety guidelines for welding operators is a document which lists out the SWP in a crisp and matter-of-fact manner and can be used as a foundation to construct on.

In addition to the workshop, Data collection 2 included the study of external documents. This type of data was specifically aimed at gathering information for the future training content. Figure 7 below presents the documents from Data collection 1 and 2 mapped against Conceptual Framework 2.

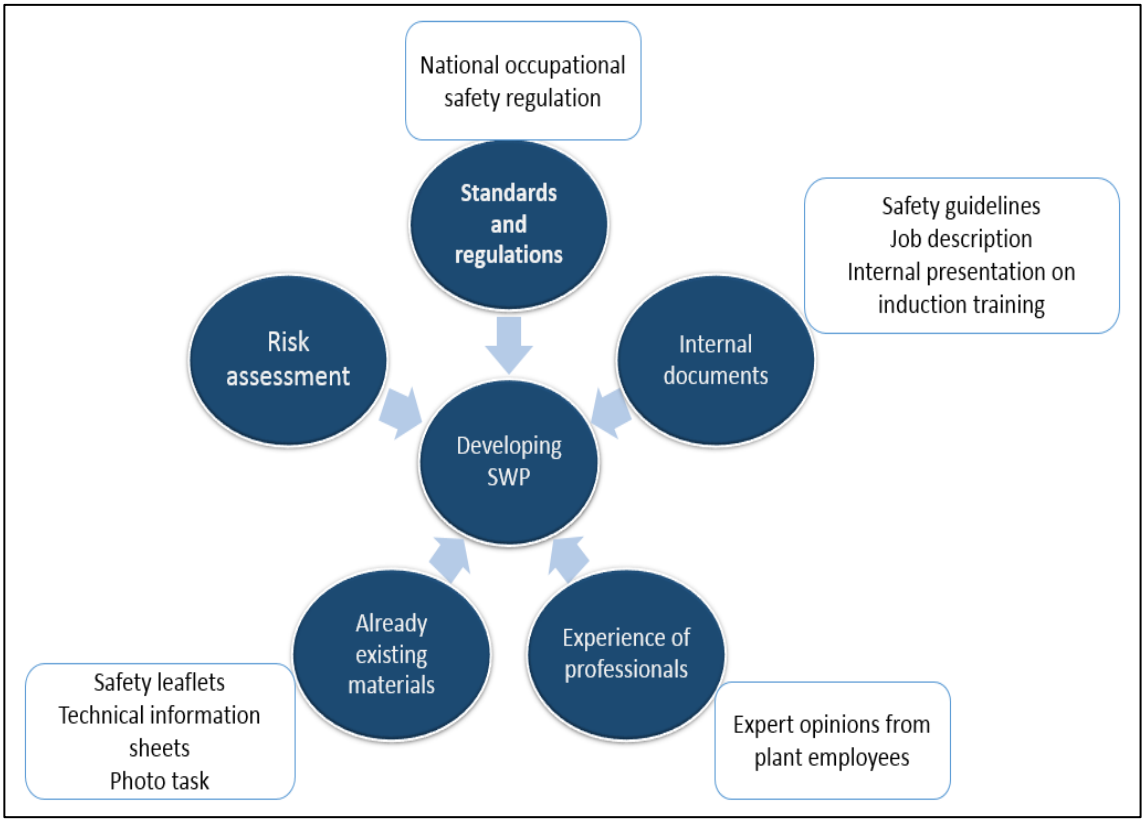

Figure 7. Mapping of Data 1&2 documentary sources against elements of Conceptual Framework 2

Conceptual Framework 2 was used to outline all the external documents studied during Data collection 2, along with some internal documents introduced in the CSA, for the purpose of interpreting their content and selecting the information needed for the proposal. These documentary sources are specified in Table 3, Section 2.3. As seen in this table and Figure 7, experience of professionals was another constituent part of Data 2 and it was collected in the form of short advice from the plant employees. Risk assessment was not conducted in the case company while this study was ongoing, therefore this information was not used to develop SWP.

In accordance with what was concluded during the workshop, the safety guidelines for welding operators, an internal document, served as a structure for the training content. This document is comprised of 5 parts, which corresponds to 5 shifts of training. Table 7 below illustrates this.

Table 7 Topics for the training content adopted from internal safety guidelines for welding operators.

1_ General requirements
2_ Safety requirements before commencing work
3_ On-the-job safety
4_ Emergency preparedness rules
5_ End-of-shift safety routine

As seen in Table 7, each part is devoted to a particular topic related to occupational safety. This system was used to analyse the materials of documentary Data 2. Specifically, the analysis was conducted in the following way: from one topic to another, the relevant information from the external documents was selected and matched against the more specific sub-topics under the main ones. Below is an example of how it was done for topic no.2 “Safety requirements before commencing work”.

Table 8 Sample of summarised findings from documentary sources for Data collection 2.

Safety requirements before commencing work		
Sub-topic		External materials
1.	Requirements for personal protective equipment and protective means	**1)** IOT 09-2016 For welding operators, p.6 **2)** National Standard GOST 12.3.003-86 p. **3)** Indg297.pdf “Safety in gas welding, cutting and similar processes” p.7 **4)** Induction training – employees, slides 4-8
2.	Routine before commencing work	**1)** IOT 09-2016 For welding operators, p.7-9 **2)** Indg297.pdf “Safety in gas welding, cutting and similar processes” p.3
3.	Workplace inspection. Checking equipment and devices.	**1)** IOT 09-2016 For welding operators, p.6-7

In a similar way, all the documentary sources were studied through the lens of the five topics. The national safety regulations served as reference documents in case a sub-topic was poorly covered in the baseline document and needed specification. Table 8 above shows an example of how it was done with the first sub-topic: the researcher appealed to the national standard in order to reconfirm the requirements for personal protective equipment for welding operators. As for the benchmark documents, they were often used when a topic needed some expansion and details.

The last source in Data collection 2 was expert opinions. This type of data is different from others to the extent that it was not properly registered or documented and it did not undergo analysis, but was directly used in the proposal. The case company employees were eager to give practical advice or share their knowledge in the format of short question and answer sessions. The data collected in such a way was, for example, on the

types of hazards their welders face during gas metal arc welding, or types of welding fume extractors the plant has on site.

Thus, the outcome of Data 2 findings analysis was a set of ideas for creating the training programme and a plan for the training content. Having analysed all kinds of data and considered what examples of best practice there are, it became clear that for the proposal to fit the needs of the case company, the following solutions are needed: 1) a written training programme with defined activities and roles, 2) power point presentations for the trainer covering one safety topic per shift, 3) a pre-training assessment quiz and a post-training assessment test, the decision on which was reached during the workshop, and 4) researcher's written recommendations on training delivery. These solutions also need to address the weaknesses and make use of the strengths mentioned in the CSA.

5.3 Initial Proposal for Training Programme

Initial proposal for the training programme was presented to the case company in August 2016, and it was accompanied by a list of recommendations for enhancing training delivery and two tests – pre-training and post-training assessment. Thus, the case company received 4 documents related to the training programme proposal: "Training programme", "Recommendations", "Pre-training assessment quiz" and "Post-training assessment test". In the sub-sections that follow, this part of proposal is not described document by document, but in the logic of Conceptual Framework 1.

5.3.1 Planning Stage

This study suggests some key elements and recommendations for the training planning stage. The proposal is based on Conceptual Framework 1, data obtained during the CSA and the proposal building stage. The proposal takes into account the special considerations relating to the assembly plant and aligns them with the existing regulatory requirements. Figure 8 below gives a summary of the planning stage elements and recommendations, and shows how they got developed throughout the research steps.

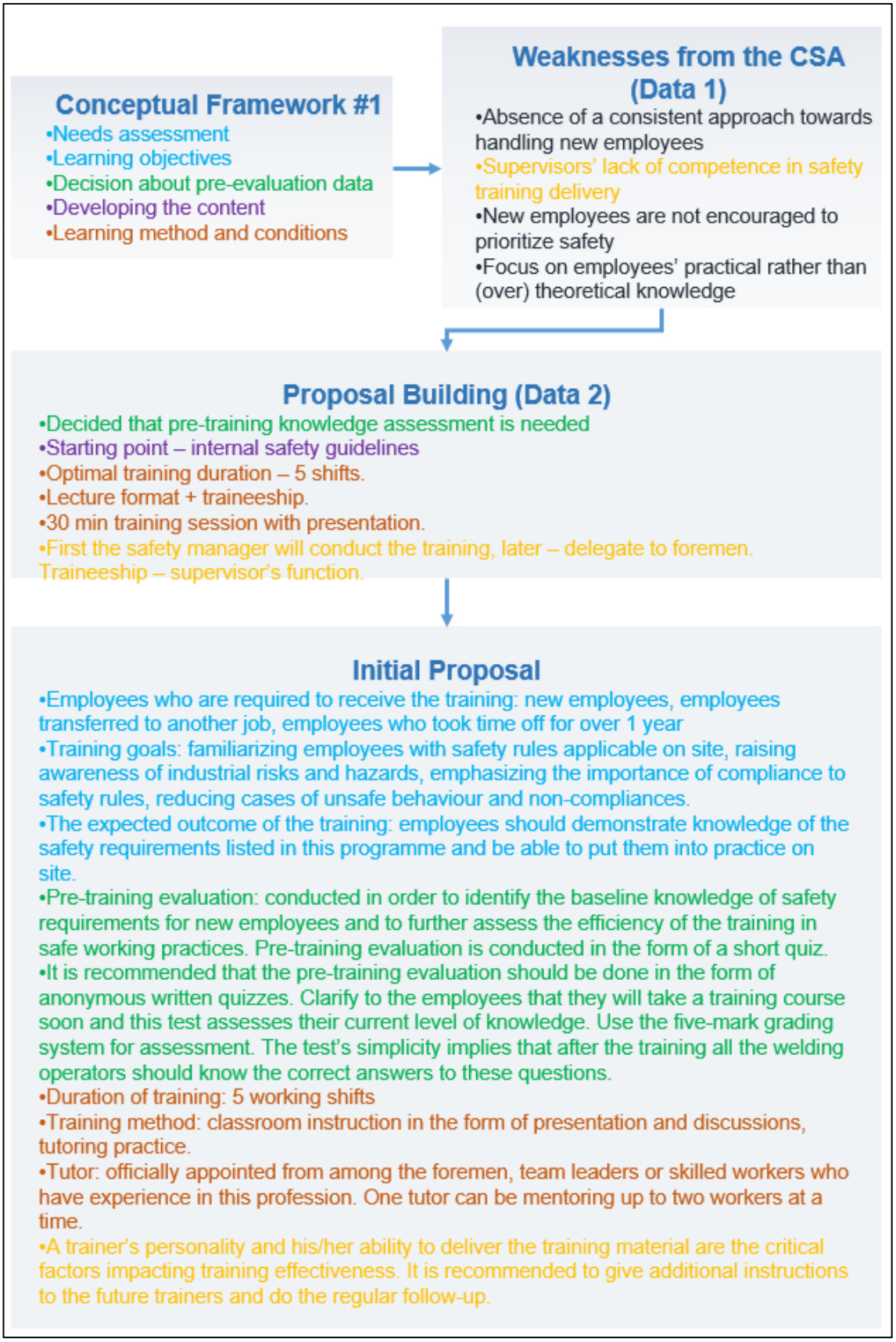

Figure 8. Summary of the proposal for the planning stage.

Figure 8 above demonstrates the creation process of some of the proposed elements. Colour code is used to denote this process. For example, review of literature on best practice showed that the training programme needs to explicitly state the training method and conditions. This topic was discussed during the workshop in Data collection 2, and the suggested ideas finally made their way into the proposal. Another example, is the weakness discovered during the CSA, concerning the supervisors' lack of competence. The workshop participants suggested step-by-step delegation of the trainer's role from the safety manager to the foremen. The proposal contains additional recommendations on this matter. The other three weaknesses from the CSA do not have any colour-coding in the chart above. There are no elements in the proposal which specifically address each of these weaknesses, but the whole proposal itself is intended to be a solution and improve these areas. The reason for that is covered in Section 5.2. The validation stage of this report shows to what extent the proposal accomplished improving on these weaknesses.

Since the CSA discovered the lack of experience in training delivery among the foremen, it is recommended that the future trainers receive additional instruction and the process stakeholder follows up on their activities as trainers. It will ensure that the foremen are not just left unattended but are provided with support in their new task of training delivery. While the trainer is a person who delivers the classroom part of the training, the tutor is an experienced employee who is responsible for the practical part of the training, or tutoring practice, as it is called in the case company context. Bearing in mind that tutoring practice is an already established practice, the training programme does not specify this area. As for pre-training evaluation, it is recommended to provide it in the form of a short anonymous quiz. This tool was introduced based on the best practice suggested by Kirkpatrick (1996) and Jensen (2005: 29-30). Anonymity will make the employees feel at ease and show the real picture of their baseline knowledge level. The quiz itself is also part of the proposal, and it consists of 4 basic questions every welding operator needs to know the answer to (see Appendix 3). In the course of the training the same information is emphasised for better memorization. After the training the answers to these questions should be on the tips of the trainees' tongues.

All in all, the proposed key elements aim at establishing uniformity in the training procedure and methods. The guidelines and definitions should help the process users to know exactly what the training includes and what it excludes.

After introducing the key elements, the training programme proceeds with details on what each of the five first days in a trainee's working life should be (see Appendix 4). Apart from the classroom training and practical tasks under the tutor's supervision, other activities include, for example: studying the technical characteristics and configurations of equipment, reviewing internal documents on fire safety etc. To sum up, the training programme allows a new employee's supervisor to have some freedom in arranging the learning process, but keeps him/her in the boundaries of what is planned to be done during the day.

5.3.2 Delivery Techniques and Activities

The initial proposal made use of some delivery techniques and activities in order to make the training interesting for the employees. First of all, the slides for classroom presentations contain visual images and photos illustrating the SWP. There is not much text in the slides. One of the presentations can be found in Appendix 5. The images were either taken from public domain sites, or from the benchmark documents used as Data 2 in this study. Second, the trainer notes that are placed in the comments section, comprehensively describe the SWP. The language of the notes is rather formal and subject-specific, and hence is the recommendation to trainers to use own examples and stories. Third, each of the five topics ends with a quick check in the form of a quiz or a photo task. The latter was adopted from one of the benchmark documents. These tasks are aimed at stimulating interaction between the trainer and the worker(s) and should be helpful for better learning.

Figure 9 below illustrates what delivery techniques and activities are used in the proposal and where they come from.

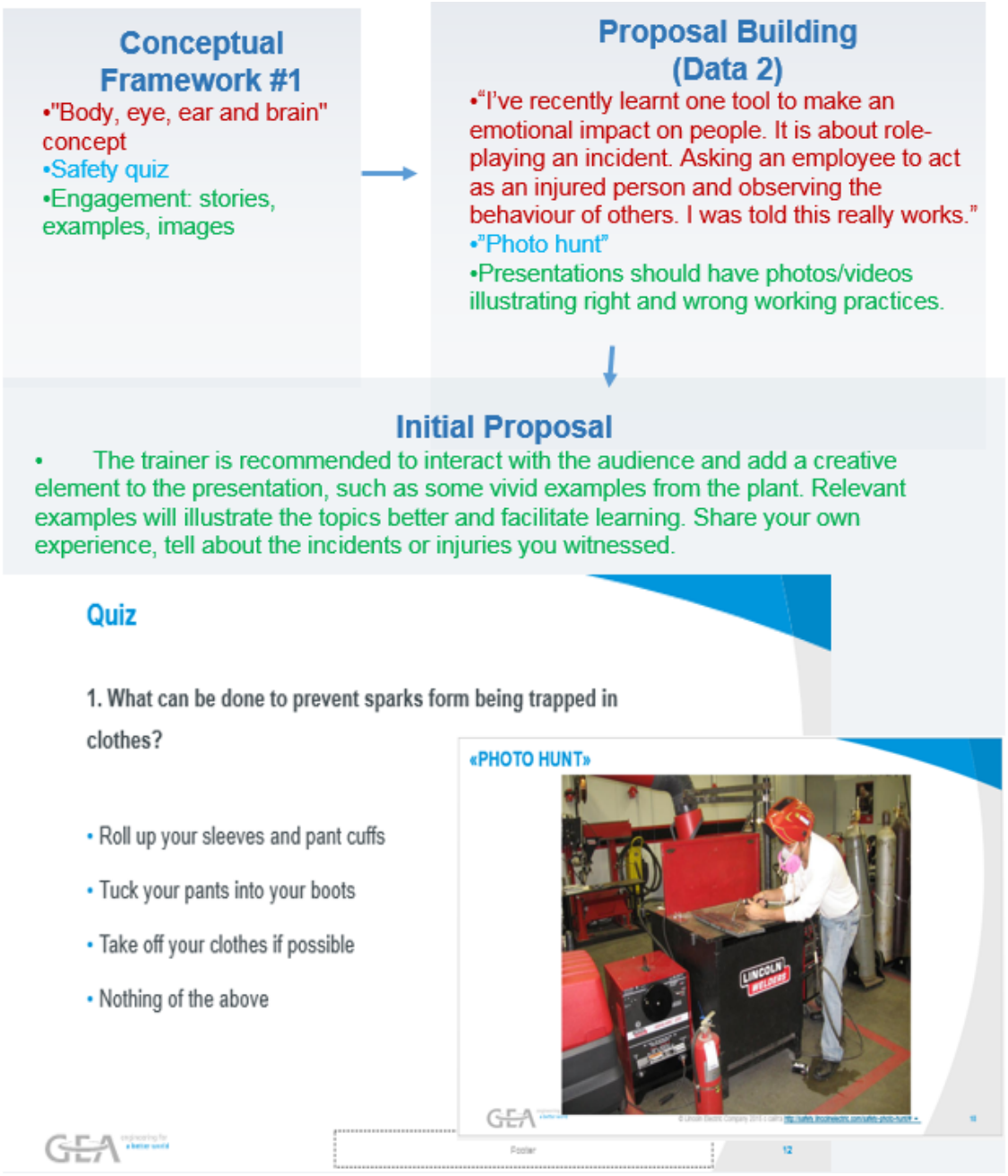

Figure 9. Summary of the proposal for delivery techniques and activities.

Among other things, Figure 9 illustrates the correlation of the "body, eye, ear and brain" concept found in literature with the idea, expressed by one of the workshop participants about the importance of emotional component in learning. Indeed, using the whole range of human senses during the teaching process is able to increase training effectiveness, as, for example, in the game *PPE partners*, described by Tapp (2007: 52-54). However, the proposal does not contain any activities of this type. The first reason for that is that

they should rely on the trainer's competence and a certain level of safety culture in the organisation, which the case company does not possess yet. Second, the company uses tutoring practice as one of teaching methods, and the employees can use eyes to watch the tutor, ears and brain to talk over the tasks at hand, and body to practice the skills. All this is considered to be sufficient at this stage of training implementation. Similarly, the quiz activity used in the proposal is not the same as the Safety Quiz technique suggested in the best practice section. The proposal made use of the idea, but realised it in a way which is relevant to the current situation. All in all, the delivery techniques and activities built into the training structure and the ones the proposal recommends to be used by trainers, were carefully selected and customised for the case company and its particular conditions. The techniques and activities mentioned above are not many, and they cannot be described as sophisticated or progressive, but rather as basic, instrumental and well-laid-out, which is exactly what the company needs to start the training process.

5.3.3 Post-training Execution

The training programme includes the stage of post-training execution, the summary of which is given in Figure 10 below.

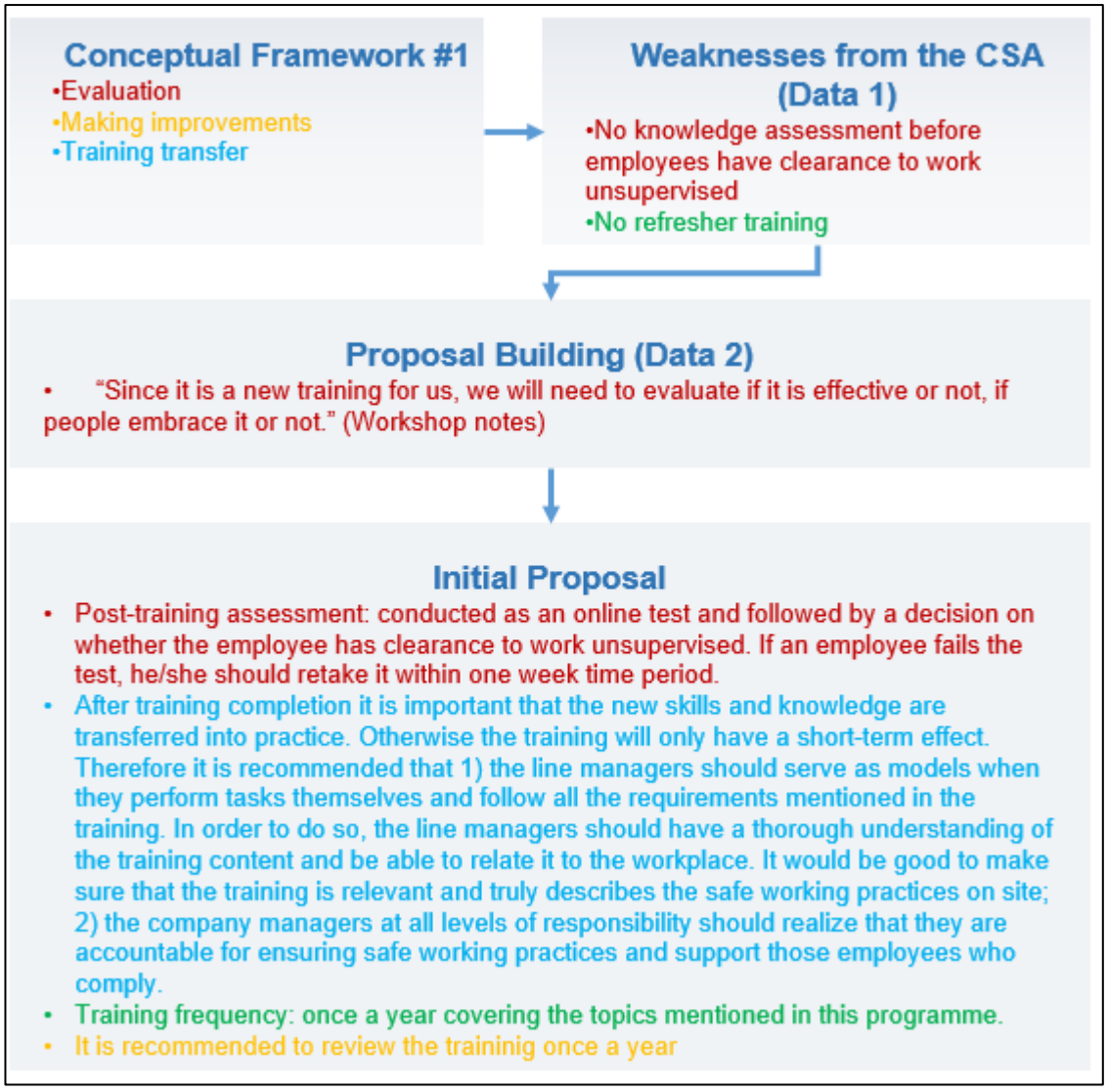

Figure 10. Summary of the proposal for the post-training execution stage.

The recommended type of evaluation is post-training assessment which measures learning that took place during the training and compares the levels of employees' knowledge and skills before and after the training. In Kirkpatrick's model it is the second type of evaluation (Kirkpatrick: 1996). It is considered to be optimal for the case company since this type of evaluation provides a clear answer to a crucial question: how much has our

employees' knowledge increased as a result of the training? This assessment is relatively easy to conduct, it does not require too much time or human resources and most importantly – it is linked with the training goals mentioned in the planning stage. The post-training assessment is recommended to be conducted in the form of an online test. The test was sent to the case company as part of the proposal along with its online version created with one of the free quiz makers. The advantage of online testing is that it allows to customise the test: to choose the number of questions an employee should answer, to decide whether or not the correct answers will be visible, to set the grading bar, as well as to analyse the test results through statistics and reports. The test included into the proposal consists of 36 multiple choice questions that are derived from the training content (see Appendix 6). The 4 basic questions from the pre-training assessment quiz are included into the test, but in a different wording. This makes it possible to compare the results of the tests and see whether the employees have benefited from the training or not. The proposed test is also to be used as a tool to determine whether an employee is ready to work unsupervised or not – a decision can be made based on his or her score combined with tutoring practice results.

This part of proposal contains some recommendations to the case company, ideas for which were taken from the literature review. First, these are the recommendations on making the training transfer into practice. Training transfer is the ultimate proof of training effectiveness, and an integral part of well-planned training implementation. Second, it is the recommendation to make improvements to the training on a regular basis. These recommendations are for the case company management and process holders.

5.4 Initial Proposal for Training Content

The proposal for training content consists of five presentations which correspond to the five topics mentioned in Table 7. One of the presentations is exemplified in Appendix 5. As a matter of fact, the information contained in the comments to slides is the SWP for welding operators. Each topic is described in more detail below.

1_Training in safe working practices_General requirements

This block describes SWP relating to general safety. It starts with a list of conditions permitting a welder to work unsupervised. Then it specifies the location of areas for smoking and lunches, as well as first aid kit and firefighting tools. Different types of welding involve a variety of hazards associated with them. This document particularises the

hazards and tells which injuries and occupational diseases they might lead to. At the end the safety requirements for vehicle-pedestrian interactions on site are specified. This part finishes with a quiz.

2_Training in safe working practices_Safety requirements before commencing work

This part of the training starts with PPE requirements for welding operators and then highlights a number of rules which the welder needs to follow before commencing work, such as workplace preparation, observing the right distance between the welding area and flammable or explosive materials. Next there is a checklist which should help the welders to ensure safe operations. After that, there are guidelines on checking gas cylinders. These are followed by specific requirements on works at height and preparing workpieces for welding. The next slide is devoted to types of damage a cylinder might have. This part finishes with a quiz.

3_Training in safe working practices_On-the-job safety

This part gives an account of SWP related to welding equipment and tools during work performance. It reminds the welder to check wire insulation, to cover timber scaffolds with non-flammable planks and never to use a welding shield with cracks. Then it points out the structures that are prohibited to use as welding return leads. Next are some other prohibitions regarding welding operations, such as doing maintenance or repair jobs to welding equipment. The following several slides are devoted to gas cylinders handling, and pay special attention to their transportation and safe manual handling. This part ends with a “photo hunt” task.

4_Training in safe working practices_Emergency preparedness rules

This part first enlists the potential emergencies in a welder’s work and then reviews them one by one. Among them are welding equipment failure, gas cylinder leak and backfire. Particular focus is given to fires and incidents with injuries. There are guidelines on incident reporting, evacuation, fire extinguishing and administering first aid in different situations. This part ends with a short quiz.

5_Training in safe working practices_End-of-shift safety routine

This part of the training content is the shortest, since it is supposed to be conducted on the last day of the five-days-long training period, and employees should sit for a test on this day. This block describes the steps an employee should follow at the end of the shift.

Summing up, the proposal presents a systematic approach to employee training in SWP. It is addressed for new employees in the first place, but the training materials can be equally used during the regular refresher trainings. The proposed training programme outlines all the training components making it a practical document for process users. It makes mention of the reference documents, as well as the required OHS procedures a welding operator needs to be familiar with. The classroom presentations contain a wide range of SWP in accordance with the understanding of SWP formulated by the case company. The SWP are taken from credible sources. The suggested training delivery techniques and activities are practicable and can be used by trainers with little experience. The proposal is completed with actionable recommendations, some of them are for process users (trainers), some for process holders, and some for the management (see Appendix 7 for the full “Recommendations” document).

6 Validation and Testing of the Proposal

In this section the validation and testing process for the proposed solution is described, including the feedback on training implementation from the key stakeholder. Next, the final proposal is presented along with the recommended next steps.

6.1 Validation of the Initial Proposal

To validate the proposal it was presented to the case company key stakeholder – Safety manager. The key stakeholder was selected for validation since she is responsible for all safety-related activities in the company and owns the safety training process. All this gives her the mandate to decide on the way the implementation is made and whether the proposal fits the company goals or not. The proposal, consisting of several documents was sent to the key stakeholder by email with explanations. Having received the proposal, the key stakeholder shared the documents with the mechanical assembly shop foreman, the future process user. All the welding operations are his line of responsibility, and the proposal specifically targets welders. The first feedback came several days after in a short and concise form: the key stakeholder stated that the proposal met their expectations, but since the training had not existed in the company before, they had neither comments nor improvement suggestions yet. Thus, the date of training implementation was appointed in order to test the proposal. It was decided that the training in SWP would be conducted with all the assembly plant welding operators, since they had not received formal training yet. To be more exact, it was planned that the tutoring practice would definitely be omitted, because it is designated specifically for new employees, and only the theoretical part of the training would be conducted. The schedule of the research was not tight and allowed for some waiting period till the case company implemented the training.

In the months preceding the training, the assembly plant underwent some changes. Firstly, some of the contractors transitioned to full-time staff members, both from among the supervisors and the floor-level employees. In the local realities it signifies a new level of rights and responsibilities: employees feel more secure and have more protection of workplace safety law. They are covered by insurance and the employer is held more accountable for safety issues. Furthermore, the employer has to ensure training provision, which leads us to the second change: during the past months many employees

took official training courses conducted by third-parties. The courses covered safety requirements on different topics, such as slinging procedures, cranes, vessels under pressure and general safety requirements in accordance with the Russian law. In addition, the company employed one more safety specialist, which indicates the increased focus on safety. Thus, on the average the employees' level of safety competence has improved as compared to the time when this study started, and the company has started to pay more attention to safety issues.

6.1.1 Training Implementation

The two-hour training session was held on 30 November 2016, it was jointly conducted by two trainers who merged their experience and expertise – the safety manager and the mechanical assembly shop foreman. The foreman had taken formal safety training courses, as described in the previous paragraph, he demonstrates notable enthusiasm about safety, leadership skills and has earned respect of his employees. All this explains why he was internally chosen to be the trainer. In addition, the foreman had received some mentoring from the safety manager in advance, and they had rehearsed the presentation. All the welding operators were gathered in a big hall, and the trainers used the slides from all the five presentations from the proposal. The slides were slightly modified if compared to the proposal: photos of the plant premises were inserted as illustrations to some safety requirements. The comments to slides were not used by the trainers to peep into, but they improvised and presented the information in their own way. The trainers did not use many examples, because the audience consisted of experienced employees and the content of the training was more or less familiar to them. For the same reason no pre-training assessment was conducted with these employees.

The proposed post-training assessment test was uploaded to the SharePoint application, and after the training session the welding operators sat for the test one by one. All the employees passed it from the first attempt. The passing score was set at fifty percent, meaning eighteen right answers out of thirty-six. The training and the test results were recorded in a protocol log.

6.1.2 Feedback on Training Implementation (Data 3)

After the training was conducted, feedback was requested from the key stakeholder. The discussion was based on open-ended questions. Table 9 below presents the key questions used for feedback collection (Data 3).

Table 9 List of questions for feedback on training implementation.

	Feedback questionnaire
1	What is you feedback on the structure and the topics of the training?
2	What is your feedback on the developed training programme? Does it serve its purpose?
3	How would you evaluate the proposed knowledge testing procedure?
4	How would you describe the impact the training had?
5	In what way did the training help to encourage employees to prioritise safety?
6	Is the training proposal relevant to the needs of your company?
7	Would you be able to modify this training to suit other professions?

As seen in Table 9, the questions were formulated to gather as much feedback a possible from the key stakeholder in an open discussion format. The qualitative data from the feedback was analysed using content analysis.

The key stakeholder expressed enthusiasm to the proposed solution. She said that the content of the presentations was appropriate, it was brought in line with their internal safety regulations and enriched by information from additional sources. Slides completion was what they wanted it to be – less text, more pictures. The key stakeholder pointed out some changes which they introduced into the training slides after the training. One of them, for example, is in presentation no.4. They added a comment to the list of incident response activities, saying that when choosing what to do first in case a colleague is injured – call the ambulance or administer first aid to the injured – employees should act according to the circumstances. As for the structure of the training and the topics, suggested in the training programme, the stakeholders wanted some changes to be introduced. Having conducted the training, they realised that instead of dividing the training content into five parts, it would be more appropriate to conduct the theoretical part of the

training on the first day of employment, and devote the other four days to practical tasks and tutoring. The key stakeholder thinks that distributing the theory into five days makes the training time and resource consuming. It means that the trainer should cover all the topics in one day, it would be a two-hour session with a break. There is absolutely no contradiction to the legal safety requirements here, so the case company can choose the training method which suits them best.

As for pre-training assessment, it seems the stakeholders saw no point in conducting it with experienced employees, so they did not. However, they do not refuse the idea itself and might use this type of assessment with new employees in the future. The post-training assessment test turned out to be a little too easy for the welders, in a sense that the passing score was set too low. The stakeholders realised that for the future new employees the passing score should be around 60-70 percent. And the same score should apply to the subsequent knowledge assessment which would be conducted after the refresher training in a year's time. This is mentioned in the proposed training programme. Moreover, one of the stakeholders expressed a concern that the employees might memorise the answers to the test in case the same questions are repeated every year, and it would become too easy and boring for them. In order to avoid such a situation, the company representatives suggested a solution: increasing the number of questions in the future iteration of the assessment test from 36 to 50 by adding more questions. According to the stakeholders, this will increase randomness and decrease the chance of employees being repeatedly confronted with the same questions. These improvements were not discussed in a critical discourse of what the proposal suggested, but referred to the next steps to be done.

When discussing the training impact, the key stakeholder found it hard to give any straightforward answer. First, the information provided during the session was not new to the employees, all of them have been with the case company for some time already. It just refreshed their knowledge and accentuated some requirements that are often violated at the production site. Nevertheless, the employees demonstrated involvement and participated in the discussion when encouraged by the trainer. For example, they eagerly answered to the short quizzes/tasks at the end of each topic, which even created a bit of a mess, because everyone wanted to speak. This type of activity is definitely intended for smaller-sized groups. The key stakeholder highlighted, that the training would be more relevant for new employees, and that is whom it is primarily intended for. Second, the training session coincided with the period of safety reinforcement at the assembly

plant, and at this stage it is hard to point out which of the safety-related activities have had the most impact. The key stakeholder fully agreed with the recommendations given as part of the proposal. She said, that some of them are easy to follow, others require awareness and commitment.

On top of everything else, content analysis of the feedback session was aimed at finding out whether the proposal managed to come up with adequate solutions to the three weaknesses in the planning stage of training provision revealed during the CSA. According to the key stakeholder, the solution components were built into a logical system, which was easy to use for new employees. So, it can be concluded that the training is able to contribute to making the approach towards handling new employees consistent. When asked if the training helped the employees to prioritise safety, the key stakeholder gave a negative answer. She said, that it was impossible to reach this goal with one training session only. Prioritising safety is about attitudes, and she thinks that first and foremost, the employees need to see commitment to safety values on the part of managers and supervisors and this is the good example they would follow. Approval of the training content means that the case company was content with the way theoretical knowledge is presented in the training, which implies that the proposal has created some balance between the amount of practical and theoretical knowledge the employees acquire.

Overall, the feedback on the proposed training programme and content, as well as the recommendations was positive, it was mentioned that it is possible to modify all the materials to suit other professions, and the company plans to do this in the nearest future.

6.2 Final Proposal

The final proposal to the case company puts forward a training in SWP for welding operators in the form of five presentations, and a corresponding training programme, completed by recommendations, a pre-training and a post-training assessment test. The proposal adds to creating an improved approach towards handling new employees in the case company, which is presented in Figure 11 below.

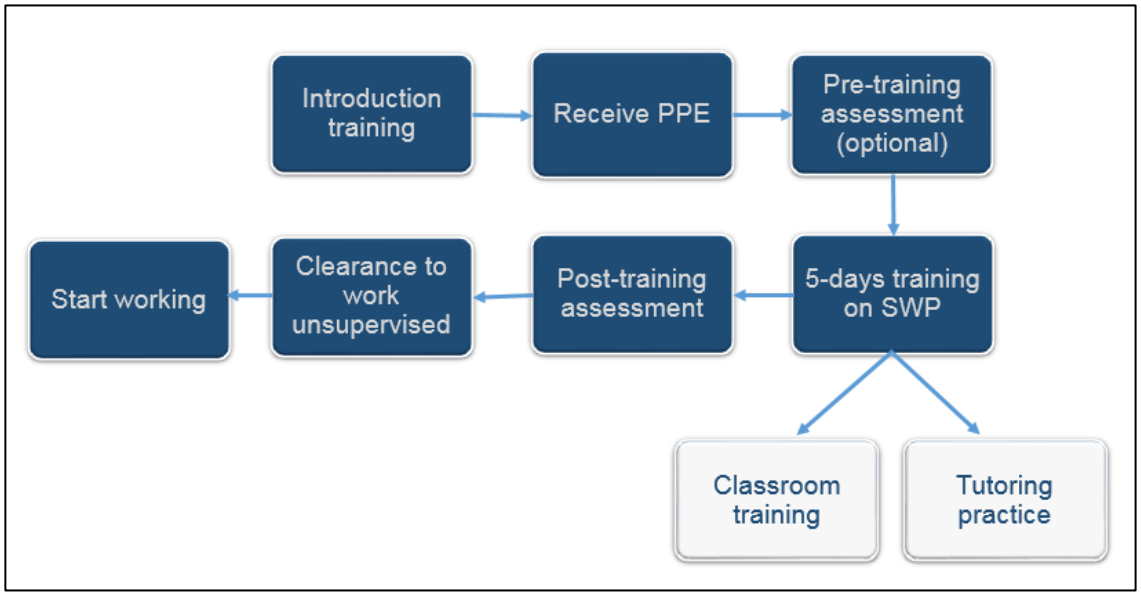

Figure 11. An improved way of handling new employees, as per the proposal.

Compared to Figure 5 form the CSA, the way of handling new employees presented in Figure 11 is considered to be in compliance with the national safety regulation, and helps the company to ensure safety of its employees from the first days of employment.

The proposed training content was not changed from the initial proposal. A few changes made by the case company were not substantial and did not require rewriting this part of the proposal. The same applied to the recommendations and both tests. The only document which was changed based on the feedback from the key stakeholder is the training programme. Table 10 below is part of the training programme, and it juxtaposes the structure of training in the initial proposal and in the final proposal.

Table 10. Course schedule for training in safe working practices for welding operators.

Shift no.	Initial proposal	Final proposal
1	General safety requirements	Theoretical training
2	Safety requirements before commencing work	Tutoring practice
3	On-the-job safety	Tutoring practice
4	Emergency preparedness rules	Tutoring practice
5	End-of-shift safety routine	Skills and knowledge assessment

As seen in Table 10 above, in the initial proposal the structure of the five-days training was based on the OHS topics, each shift devoted to a certain type of SWP, while in the final proposal the structure is centred around the types of activities a new employee performs during the shift. Thus, in the final proposal, the theoretical training should be conducted on the first day. On the second, third and fourth days accent is given to tutoring practice, and the fifth day marks the end of the training with post-training assessment and decision on whether the employee has clearance to work unsupervised or not. The whole training programme in its final version can be found in Appendix 4.

The final proposal sets a standard for training in SWP provision at the assembly plant. The training is relatively easy to modify for other professions. Regarding the training content, there are topics applicable to all professions, such as general safety requirements and emergency preparedness. Other topics require a closer look, since employees of other professions are exposed to different hazards and have distinct job duties. However, the algorithm of developing the SWP for other professions is the same: one needs to take internal safety guidelines and job description for this profession and synthesise it with other internal safety guidelines, national occupational safety requirements in relevant OHS topics, expert opinions and some already existing materials on this topic from trustworthy resources. The same applies to knowledge assessment. Thus, in the post-training test for any other profession on site, around 25% of the questions will remain the same, but others need to be replaced in order to correspond with the training content. As far as the training programme is concerned, it will remain the same in terms of key elements and course schedule, but the detailed plan for the five training days will need changes.

6.3 Recommended Next Steps

The case company has not conducted proper risk assessment on site yet. Once it is conducted, it is highly recommended to use this information to change the training content. Being a crucial process for identifying hazards, analysing risks associated with them and determining ways to eliminate or control those hazards, risk assessment is most likely to result in new methods of hazard control and changes in the workplace. Therefore, the SWP might undergo changes and the training should reflect that.

In the future, it is recommended to review the training method and delivery techniques and activities for yearly refresher trainings. Once the employees get accustomed to the training format, it is good to incorporate new activities, for example videos or safety games. In addition, the training method can be changed from the standard classroom lecture to an interactive group work, or a safety contest. This will keep employees involved. An example of how it can be realised is the PPE Partners game, suggested by Tapp (2007: 52-54). However, before introducing any changes of this kind, it is necessary to make sure that the employees' overall safety awareness has improved and they are ready to embrace some novelty. Otherwise, instead of being educational, these methods might turn to be ineffective and distractive.

Next, the recommendation for the future is that the post-training assessment test does not only have more questions added, as the stakeholders suggested, but the questions are also reformulated. Instead of multiple choice, they can be matching questions, questions with short answers, or completion questions. This will allow for more variety and might make the test more challenging. The type of training evaluation this study uses is measuring learning, that is, evaluating of the skills and knowledge an employee has acquired. Knowledge is measured by means of the post-training assessment test, and skills are measured by the tutor (possibly, together with the trainer) in the process of tutoring. It is recommended to work out a written list of criteria for evaluating skills gained during the training. It can be, for example, a checklist for different skills a welding operator should demonstrate.

For the purpose of training reinforcement it is recommended to organise a formal safety committee on site. Members of the committee should include both supervisors and workers in equal representation. This committee will promote cooperation between employees and serve as a platform for discussions.

It was mentioned in Section 4, that in spite of being part of GEA group, no corporate OHS requirements are applicable at the assembly plant yet. The case company is a relatively new acquisition for GEA. However, once corporate standards and OHS policy come into effect, it is recommended to review the training and align it with the new standards and policy.

7 Discussions and Conclusions

This section summarises the results of this study and evaluates the study against the objective set in the beginning.

7.1 Summary

This study developed a training programme in safe working practices (SWP) for employees of the case company on the example of one profession – welding operators. Specifically, the outcome is the training content and a corresponding training programme, which in combination serve as a measure for safety improvement at the operational site. Additionally, the elements of the proposal can be used as templates for developing trainings for other professions. Training in SWP is mainly for new employees, but the case company was not providing it, thus violating the national occupational safety law, and being one of the causes of non-compliances on site.

The study applies the case study research approach and was conducted in several steps, the first one being the review of the best practice. This review resulted in a creation of two conceptual frameworks – one on the safety training development and the second one – on developing SWP. Further on, the current state analysis (CSA) was conducted in the case company in order to get an understanding of the safety situation and the current way of handling new employees. The findings of the CSA were analysed through the lens of the two conceptual frameworks, and resulted in a summary of strengths and weaknesses of the current safety training practice. For example, it was found that the case company used tutoring to pass knowledge to new employees, but new employees' knowledge were not assessed before they had clearance to work unsupervised.

For building the initial proposal, a workshop was conducted with the case company lead-team and the ideas generated during it were merged with the best practice and findings from the CSA. Additionally, a number of external documents was explored for the purpose of creating SWP. The initial proposal underwent a validation process in the form of a full-scale implementation, and was followed by positive feedback from the case company with some improvement ideas to the training programme. Based on that, the final proposal was created.

The proposal presented to the case company at the end of this thesis process consisted of the following documents: 1) five presentations for classroom training, 2) pre-training

assessment quiz; 3) post-training assessment test, 4) training programme for training in SWP, 5) recommendations on training delivery. The training is built upon the three cornerstones – planning, delivery techniques and activities and post-training execution, hence is the proposal parts. All of them are connected and create a systematic approach towards training in SWP provision.

One element of the planning stage is pre-training evaluation in the form of a short quiz with an explanation of its purpose to the case company management, and recommendations on how to conduct it. The quiz is a simple and effective tool, and its implementation adds to the training overall consistency. Training transfer is a determinant element of the post-training execution stage and if overlooked, can considerably decrease training effectiveness. The proposal contains recommendations to the management on how to make the training transfer into practice via, for example, the commitment of line managers to the those safety requirements which are being mentioned at the training.

Also, the proposal pays special attention to the role of the trainer and presents a test for post-training knowledge assessment. The proposal is ready to use as soon as new workers are employed, or as a regular refresher training. The proposal materials will be used as templates for creating trainings in SWP for the case company employees of other professions.

7.2 Thesis Evaluation

The objective of this study was to develop a training in SWP and a corresponding training programme for welding operators. By reaching this objective the goal was to set a standard for training in SWP provision at the assembly plant and contribute to safety improvement. This objective was addressed through the following outcomes. First, the SWP for welding operators were developed, and they constituted the content of the training. The training content took shape in the five presentations. Second, a corresponding training programme describing the key elements of training, course schedule and day-by-day activities was created. Furthermore, the proposal was completed by a pre-training assessment quiz, a post-training assessment test and recommendations to the case company on training delivery. During the validation phase of this report it was concluded that trainings for other professions will be modelled after the proposed materials.

The outcome of this study was defined as a proposal to management of a training in SWP for welding operators and a corresponding training programme, that jointly would give a start to a comprehensive approach towards the communication of SWP in the case company. In the end, the outcome that was set as a target for this study was reached in its entirety, therefore the objective can be considered as achieved.

The biggest challenge of this thesis project was that the researcher was not able to develop an insider's viewpoint on the current situation in the case company. There were two reasons for that: first, the researcher is not an employee of the case company and second, the company is located in another country. Due to this, all the data collected from the case company employees was extremely valuable for the report. It is considered that an insider's viewpoint and observations on site could have made the findings of the CSA more accurate.

This drawback was compensated by employing multiple documentary sources, including best practice, safety regulations, benchmark documents etc., in order to create a well-grounded proposal. The proposal building process was time consuming, especially keeping in mind that the materials were constructed in Russian and then translated into English. The validation phase was another strong point of this study, since it included full-scale training implementation, which allowed for well-founded conclusions.

7.3 Relevance, Validity and Reliability of this Study

For the purpose of evaluating the quality of this study, three criteria are used: relevance, validity and reliability. This report is addressing a relevant business challenge, since the absence of a training in SWP and a corresponding programme is a real-life problem, and practical need for the training is evident for the management of the company. The literature selected to construct the conceptual frameworks is relevant since it helps to contribute to the proposal, and the resources are the best available. The relevance of the developed solution is established during Data collection 3, when the key stakeholder confirms that the proposal reflects the realities of the case company, and the training does not contain any imaginary requirements or ungrounded suggestions. During the same interview it was verified that the proposal is applicable to other professions inside the same company, which means it is internally transferrable. As far as external transferability is concerned, it might be possible to use the proposal at a different production plant,

though problematic, since it involves many aspects that are only relevant for the case company.

Quinton and Smallbone (2006: 126) point out that the researcher can prove the *validity* of his/her work by making the rigour and the research approach transparent. Riege (2003: 78) lists various techniques for improving validity, such as using multiple sources of evidence, establishing chain of evidence and asking the informants to review the case study report. To achieve validity in this study, a synthesis of several data sources was used, such as company internal documents, benchmarks, national regulations and interviews. It was ensured that the collected data created a chain of evidence. With verbal data it means, first of all, transcribing the interviews, and second, establishing a link between the interview questions, the answers received and the conclusions made after data analysis. With written data it means connecting the reason for choosing a particular document with the selected document excerpts and the way they are interpreted and embodied into the proposal. The informants were asked to review the interview transcripts and to give opinions on the case study analysis during the workshop, which also enhanced validity.

Reliability is related to the consistency of research results and can be strengthened, for example, by using different data sources and data collection tools, or collecting data at different time points (Quinton and Smallbone 2006: 130). Reliability of this study is ensured through collecting data from a variety of sources and using such data collection tools as interviews, a workshop and review of documents. In spite of the fact that only three people were interviewed in Data collection 1, they represented 7,5% of personnel and almost half of the leadership team. Interviews with floor-level employees were not considered due to the focus of interviews on supervisory issues. The data was collected at different time points in the course of research, which lasted for almost 10 months. The data were carefully analysed, categorised and checked with stakeholders. The data from the case company employees was compared with the documentary sources to avoid losing any valuable information or bringing errors to the proposal. Considering the duration of the study and rapid changes within the company, it would be difficult to fully replicate this report. However, any researcher can arrive at similar conclusions, provided that the research is conducted right after this one.

Although the research validity is considered to be high, it could have been further improved by finding the best practice solutions from other companies to provide an insight

into how the training in SWPs is implemented there. The validity could be also improved by including observation by the researcher as a method of data collection. However, the validity and reliability of the study were considerably strengthened in the validation stage, when the proposed solution was not just piloted, but fully implemented with acceptance from the key stakeholder. Moreover, it was ensured that the solution was created collaboratively with the respondents and their suggestions and feedback were taken into consideration throughout the data collection stages. In summary, this study can be considered as reliable, since it reached its initial goal from the perspective of the case company. Eventually, the case company evaluated the proposed training programme as clear and systematic, and the training content – as substantive and logical.

7.4 Final Word

Finally, it must be admitted that this report benefited from the method it used, namely, the case study. It allowed to utilise a combination of data collection techniques, and to get a richer understanding of the context, not just study the phenomenon proper. What is meant, is that it was possible to explore the safety situation at the plant in the phase of the CSA, instead of just focusing on the non-existent training in SWP. Further on, this context opened a broader perspective on what the outcome of this study needs to contain in order to address the problematic areas. At the same time, the case study approach enabled to narrow down the case by excluding all other professions but welding operators. Thus, the objective of this study became concrete and attainable.

The proposal started a systematic approach towards safety training provision in the case company, however, continued efforts are needed to finalise this task. Further research could concentrate on the analysis of other types of safety trainings, for instance, pre-job briefings, post-incident education and trainings for supervisors and management, as well as integrating them all into a system. Action research would help to establish a greater degree of accuracy on such a study.

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Appendix 1

Current State Analysis Interview Form

Master's Thesis Interview

Topic: Current state analysis of the case company

Information about the informant (Interview 1)

Table 1

Details	
Name (code) of the informant	
Position in the case company	
Date of the interview	
Duration of the interview	
Document	

Field notes (Interview X)

Table 2

	Topic(s) of the interview	QUESTIONS	FIELD NOTES
1	**Identify strengths and problems**	***How would you assess the current level of safety on site?***	
		How much priority do you give to employees' safety during daily production routine?	
		Based on your experience at this plant, why do accidents or near-accidents occur?	
2	**Current training practices**	***How do you handle new employees? What do you teach them?***	
		How long does it take you to couch a new employee?	
3	**SWP definition**	***What do SWP describe?***	

Appendix 2

Field Notes from Data Collection 2 Workshop

Topic: Suggestions for training development for the case company

Table 1

Number of participants	6
Participants	Plant director, foremen, safety manager
Date	10.05.2016
Duration	1 h 20 min.

Table 2

	Topic(s) of the work-shop	Questions to discuss	FIELD NOTES
1	**SWP defi-nition**	How would you define SWP? The preliminary def-inition adopted during data 1 collection is "SWP are methods of work de-scribing how to carry out specific tasks in order to minimise risk to people, equipment and environ-ment".	SWP should cover both legal requirements and corporate standards, and include the practical application of skills. Therefore, the final definition is" SWP are documented methods of work describing ways of carrying out specific tasks in order to minimise risk to people, equipment and environment. They are consistently used in practice".
2	**Summary of strengths and weak-nesses of CSA**	Ideas? Thoughts?	The weaknesses are true and they are our problematic areas in general. We still have a lot to work on, training is only of the elements. But if we have a good training and implement it well, it might be a good step forward. We will be able to improve on these weaknesses.
3	**Planning**	What is the optimal dura-tion of training for the plant employees? Should the duration be the same for employees of all pro-fessions?	One of the opinions: "Duration of the training should de-pend on the employee, for some a 2-shifts training is enough, for others it would take more than 5 shifts." The majority agreed that it should be 1 week or 5 shifts. And this duration of training is applicable for all professions.

		Who do you think will be conducting the trainings?	To start with, the safety manager will be conducting it. Supervisors will also learn from that. But then this function can be delegated to supervisors. Traineeship should remain the supervisor's function. Anyway, he's always there with his team and he is competent to teach them the practical stuff.
		Will the training be provided for all employees or only to those engaged in work with occupational hazards?	It is good to have this training provided to all the employees. The production site has an open area design and the majority of employees are exposed to occupational hazards, for ex., noise. Welders can sometimes work in the middle of the shop, so all the employees will be exposed to welding aerosols, sparks and flashes. That's why all the production employees need this training.
		What training delivery mode is the most effective? Method? Conditions?	Firstly, this training should be conducted with all our employees in groups. There are several groups of professions (for ex., all the mechanics have a supervisor, welding operators have a supervisor etc). The best way will be to combine the lecture format (a power point presentation) and traineeship. Thus, having learnt smt. from the presentation, they can go to workplaces and apply this knowledge.
		Training content. Ideas on sources for safe working practices.	First and foremost, there are <internal> safety guidelines. They contain this information. One can start out from there.
4	**Delivery techniques and activities. Training content.**	What are the critical tasks and most hazardous tasks performed by welding operators?	In fact, all the welding operators do is welding. They do 3 types of welding – argon arc welding, semiautomatic welding and manual welding. The safest method out of the three is argon arc. Semiautomatic and manual welding have more sparks and brighter flash.
		What is needed for the training to be effective? Ideas for training delivery techniques.	Maybe we ought to cover 2-3 OH&S topics per day, not all at once. This will make employees more focused. One of the opinions: "I've recently learnt one tool to make an emotional impact on people. It is about role-playing an incident. Asking an employee to act as an injured person and observing the behavior of others. I was told this really works." All agreed that each day's presentation should last for about 30 min. Presentations should have photos\videos illustrating right and wrong working practices.

5	**Post-training execution**	Is post-training evaluation necessary? Ideas on how to evaluate training effectiveness.	Since it is a new training for us, we will need to evaluate if it is effective or not, if people embrace it or not. But we also need to evaluate their knowledge after the training. Thus, both pre-training knowledge assessment and post-training evaluation should be included.
		How can the training enhance safety on the site?	Currently the problem is that employees don't know the safety requirements. Proper training should make them more aware of safety and impact their behavior. Everyone is convinced that this training is essential for enhancing safety.
		What level of priority do you assign to employee safety?	All said that safety is number one priority. *<Researcher's comment: it felt like the participants were just using a cliché to answer this question, and that they dissembled the fact that production goals were number one>*

Appendix 3

Pre-training Assessment Quiz for Welding Operators

1. List the occupational hazards affecting welders

   _____

   _____

   _____

   _____

2. List the emergencies which make it impossible for a welder to work safely and he/she must stop working.

   _____

   _____

   _____

   _____

3. It is prohibited to use all the gas from a cylinder. What residual gas pressure should be in oxygen cylinders? Answer: _____
   In acetylene cylinders? Answer: _____

4. How far from the welding area can flammable materials be placed? Choose 1 correct answer.
   - At least 5 m
   - At least 10 m
   - At least 15 m
   - At least 20 m

Appendix 4

GEA Refrigeration RUS LLC

Approved by:
General manager
Oliver Cescotti
«___»_____2016

TRAINING PROGRAMME

Training on safe working practices for welding operators

UP 08-2016

The current safety programme was developed in compliance with regulatory documents containing national safety requirements, based on the Established procedure for safety training and knowledge assessment in organizations, approved by the decree of the Ministry of Labour and the Ministry of Education of Russian Federation no. 1/29 adopted on 13.01.2003. This programme is intended for employees, responsible for providing the training on safe working practices to welding operators.

I. KEY ELEMENTS

Employees who are required to receive the training: new employees, employees transferred to another job, employees who took time off for over 1 year

Duration of training: 5 working shifts

Training goals: familiarising employees with safety rules applicable on site, raising awareness of industrial risks and hazards, emphasising the importance of compliance to safety rules, reducing cases of unsafe behaviour and non-compliances.

The expected outcome of the training is that employees should demonstrate knowledge of the safety requirements listed in this programme and be able to put them into practice on site.

Training method: classroom instruction in the form of presentation and discussions, tutoring practice.

Tutor: officially appointed from among the foremen, team leaders or skilled workers who have experience in this profession. One tutor can be mentoring up to two workers at a time.

Pre-training evaluation: conducted in order to identify the baseline knowledge of safety requirements for new employees and to further assess the efficiency of the training in safe working practices. Pre-training evaluation is conducted in the form of a short quiz. The pre-training evaluation is optional, not obligatory.

Post-training assessment: conducted as an online test and followed by a decision on whether the employee has clearance to work unsupervised. If an employee fails the test, he/she should retake it within one week time period.

Training frequency: once a year covering the topics mentioned in this programme

II. Course schedule for training in safe working practices for welding operators

Topic no.	Topic	No.of shifts
1.	Theoretical training	1
2.	Tutoring practice	1
3.	Tutoring practice	1
4.	Tutoring practice	1
5.	Skills and knowledge assessment	1
	Total:	5 shifts

III. Programme

Shift 1. Theoretical training.

Introduction to the facility, production area, utility rooms, eye was stations, lunchroom and bathrooms.

Theoretical training covering 5 topics:

1) General safety requirements in accordance with IOT 02-2016 and IOT 09-2016. Draw attention to the existing hazards and risks during cutting and welding. Personal protective equipment for welding operators. Shop safety rules in accordance with IOT 03-2016. Rules which govern interactions between pedestrians and vehicles on site. Prohibition against walking or running into the path of a vehicle, or under lifting equipment, or entering areas closed by barriers.

2) Safety requirements before commencing work in accordance with IOT 09-2016. Requirements for personal protective equipment and protective means. Workplace inspection, checking the devices and measuring equipment, machines, dates of regular maintenance, proper ventilation.

3) On-the-job safety requirements in accordance with IOT 09-2016. The requirement to install flash screens around the welding spot. Handling gas cylinders: storage, usage, transporting.

4) Emergency preparedness rules in accordance with IOT 09-2016 and IOT 04-2015. Discussion on the potential emergencies in the area, in the shop. Emergency response activities. Study of fire safety requirements, first aid treatment. Emergency numbers.

5) End-of-the-shift safety routine in accordance with IOT 09-2016. Personal hygiene.

Learning by observation: watching the tutor at the workplace.

Shift 2. Practice under the tutor’s supervision.

Study of the internal code of labour conduct and work patterns.

Study of the technical characteristics and configurations of welding equipment. The technical characteristics of flame machining equipment (gas cylinders, transforming valves, pressure gauges, torches, welding cables, safeguarding mechanisms).

Practical tasks under the tutor’s supervision.

Shift 3. Practice under the tutor’s supervision.

Study of the typical technological processes of welding production.

Practical tasks under the tutor’s supervision.

Shift 4. Practice under the tutor’s supervision.

Study of the plant fire safety instructions.

Practical tasks under the tutor’s supervision.

Shift 5. Skills and knowledge assessment.

Practical tasks under the tutor’s supervision.

Assessment of skills and knowledge gained during the 5-days training. Online testing.

Appendix 5

Presentation for Shift 2. Safety Requirements before Commencing Work

Slide 1

Slide 2

Before commencing work, the welding operator shall check to see if all of his/her personal protective equipment (PPE) is available and in good condition. The following PPE are required to perform welding operations:

1. Welder's suit as a form of protection from sparks
2. Protective shield
3. Safety boots
4. Gloves

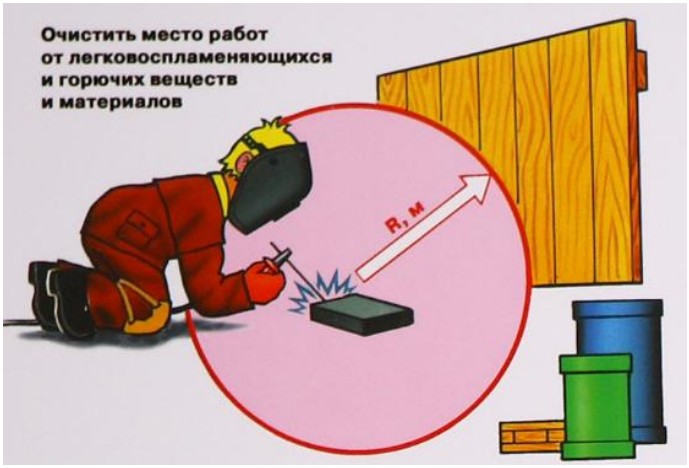
Fasten your sleeve cuffs. Don't tuck the jacket into your pants, wear your pants outside your boots. Lace up safety boots fully.

Use closed-type safety glasses during cutting or welding, change colour filters depending on the material you're processing

Use respiratory protection equipment depending on the material you're processing

Safety requirements before commencing work

Workplace preparation



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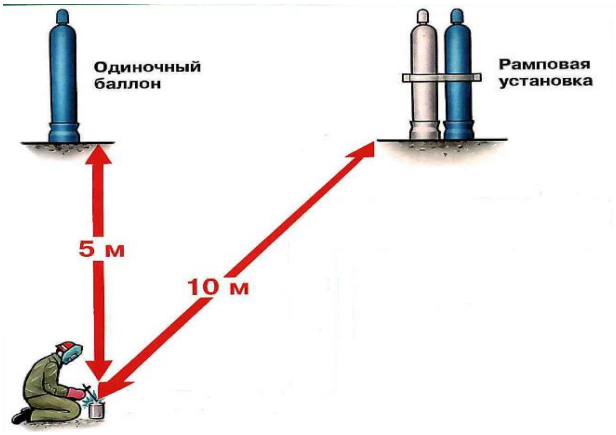
Slide 3

Examine your workplace and prepare it by taking away any unnecessary items or flammable materials. Protect nearby combustible materials that cannot be moved. Check the floor, it shouldn't be wet or slippery. In case it is, clean the floor or ask the cleaner to do it. Keep fire extinguishers nearby.

Safety requirements before commencing work



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Slide 4

Flammable matters should be placed at least 5 m away from the welding area, and explosive materials and installations – at least 10 m away from the welding area.

Safety requirements before commencing work

Equipment and cables in good order?

Grounding in order?

All devices in working order?

Welding cables safely placed?

Fire-fighting equipment in place?

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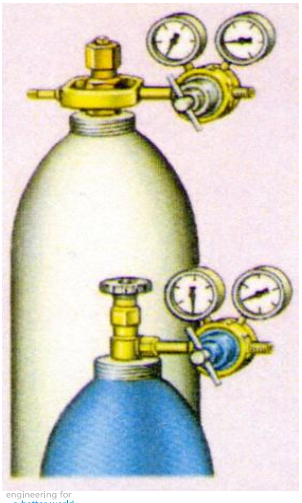
Slide 5

Before commencing work make sure that the welding equipment you're going to use is properly functioning. Examine the insulation of wires and electric holders, check the grounding of the welding unit, welding table and the jaws. Check your protective shield or mask, colour filter, rub the glasses, replace them if needed. Check the starters, controllers and measuring devices. Check the generator and transformer voltage output. Place the welding cables out of aisle ways to prevent damage to insulation. They shouldn't be exposed to high temperatures or moisture. Check the workplace for fire-fighting equipment and make sure it functions properly.

Safety requirements before commencing work



CHECK!

- Transforming valves in place
- Pressure gauges in order
- Transforming valves painted in the same colour as the cylinder
- Pressure gauge thread in order
- Adapter gasket and filter on the oxygen intake connection

PRESSURE GAUGE MALFUNCTIONS:

- No tag with recorded yearly maintenance
- Expired tests
- Broken glass or deformations
- The gauge hand doesn't move during gas feeding

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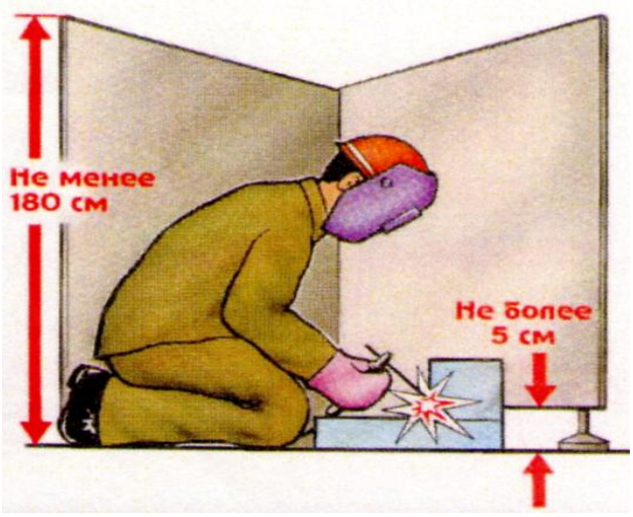
Slide 6

Oxygen cylinder and any other combustible gas cylinders should have transforming valves in working order. Before commencing work check that the pressure gauges on the valves are in good order. Never use transforming valves that have no pressure gauges. The transforming valve should be painted in the same colour as the corresponding gas cylinder. Check the oxygen intake connection, it should have an adapter gasket and a filter, inspect pressure gauge thread. If the transforming valve pressure gauge is out of order, DON'T COMMENCE work! How to identify malfunctions of a pressure gauge? Examples of malfunctions: no tag with recorded yearly maintenance; expired yearly tests, broken glass or deformations; the gauge hand doesn't move during gas feeding

Safety requirements before commencing work



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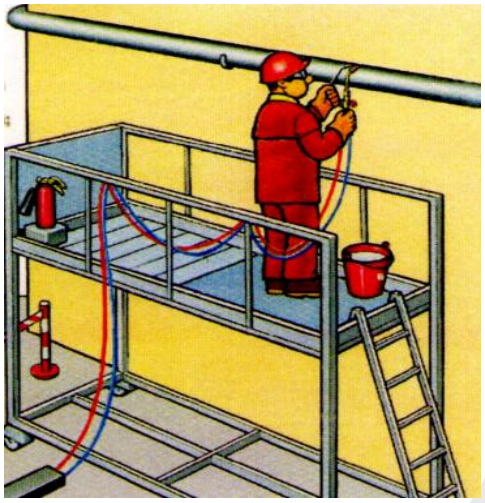
Slide 7

Welding operations should be performed in specially equipped welding areas. If welding is conducted outside a welding area, the welding spot should be guarded by screens at least 1.8 m high. These flash screens protect others in the area from flash.

Safety requirements before commencing work

For jobs at height of 1.8 m or more, the welder's workplace should have guard rails



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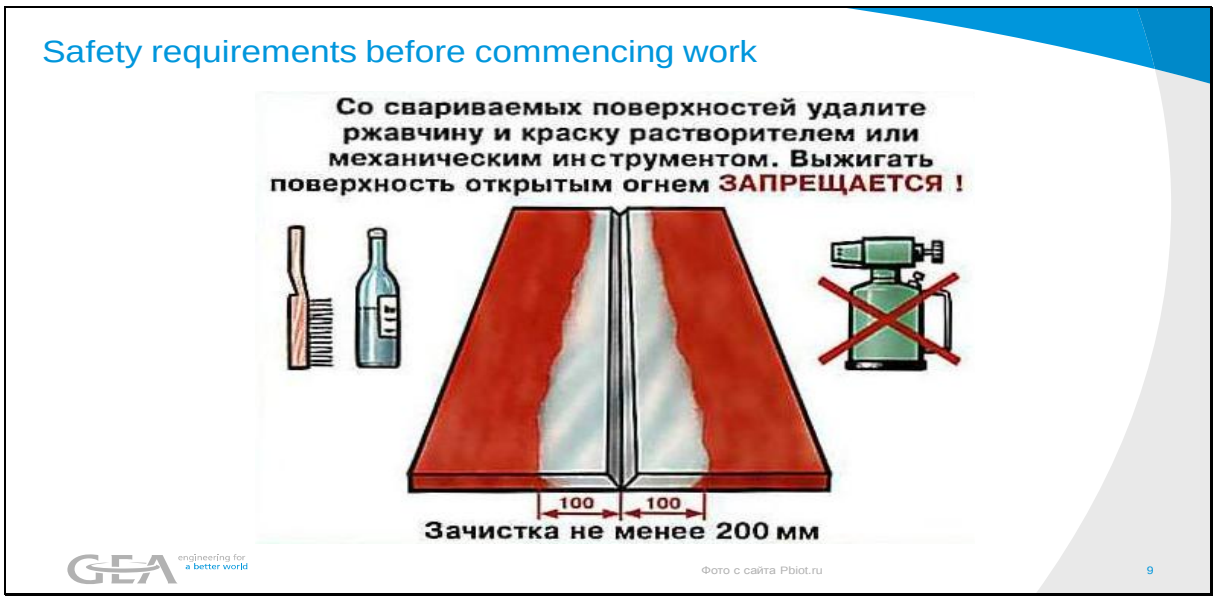
Slide 8

If welding operations are conducted at height of 1.8 m or more, the welder should be provided with safe workplace access including guard rails.



Slide 9

Before commencing welding operations, the welder should make sure that the weldment edges and surrounding area (20-30 mm) are thoroughly cleaned and have no rust, slag, etc. Wear safety glasses when cleaning the edges.

Slide 10

Cylinders with defective valves should be withdrawn from use. It is not to allowed to commence work if the cylinder is damaged (distortion of the cylinder, corrosion, gouges) or there are not tags with recorded maintenance. Cylinders having gas leakages should not be used or transported. Malfunctions of acetylene generator hydraulic valve as well as other defects mentioned in its operating manual should be taken seriously –using such a generator is forbidden!

Safety requirements before commencing work

Report unsafe conditions, hazards or defective equipment to your supervisor

Correct malfunctions and GET your SUPERVISOR'S APPROVAL before commencing work

Slide 11

If your workplace is unsafe, or equipment, instruments or devices are defective, please report such cases to your supervisor. Correct the discovered malfunctions and get your supervisor's approval before commencing work

Quiz

1. What can be done to prevent sparks form being trapped in clothes?

- Roll up your sleeves and pant cuffs
- Tuck your pants into your boots
- Take off your clothes if possible
- Nothing of the above

Slide 12

Correct answer: nothing of the above

Quiz

2. How far away from the welding area can flammable matters be placed?

- At least 5 m away
- At least 10 m away
- At least 15 m away
- At least 20 m away

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Slide 13
Correct answer: at least 5 m away
Specifically, gas cylinders intended for indoor usage, should be placed at least 5 m away from naked flame sources, such as torches or burners.

Quiz

3. It is forbidden to commence work if the gas cylinder ...

- has corrosion
- doesn't have a tag with recorded maintenance
- has a defective valve
- All the above

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Slide 14
Correct answer: all the above

Slide 15

Post-training Assessment Test

1. What electrical safety qualification level should a welder have?
- Level 1
- Level 2
- Level 3
- Level 4

2. Three types of radiation that affect a welder: intense visible light, infrared radiation and … radiation.
- nuclear
- gamma
- ultraviolet
- beta

3. Can ultraviolet radiation be seen or recognised by other senses?
- Yes
- No
- Only sense in the form of heat

4. Is it possible to use air instead of oxygen in welding?
- Yes
- No

5. Never use the equipment which is
- old
- no equipment ground

6. Never use electric appliances while
- standing on a wet surface
- working in a dimly lit room

7. You are allowed to put on safety glasses over regular glasses
- true
- false

8. Why shouldn't you wear nylon clothing when welding?
- Because you will get sweaty
- Because if it catches fire it will melt to you skin
- Because static electricity can build up and cause an electric shock

9. Oxygen's chemical symbol is…
- CO2
- H2O
- O2

10. Acetylene's chemical symbol is…
-C2H2
- H2O
- C3H8

11. Oxygen + oil = ?
- corrosion
- explosion
- oxidation

12. What should you check before commencing work?
- proper grounding
- cables insulation
- your protective shield or mask
- all of the above

13. You don't need guards to confine heat or sparks as long as you have a fire-extinguisher nearby
- true
- false

14. Cylinders used in welding operations can explode if they are stored near ignition sources
- true
- false

15. Can welding operations be performed outside the welding area when there are other workers at the location?
- no
- yes, if works are approved by supervisor
- yes, if the welding spot is guarded by screens

16. For jobs at height of…, the welder's workplace should have guard rails.

- 1 m or more
- 1.5 m or more
- 1.8 m or more
- 2.5 m or more

17. What is the right method to transport a cylinder several meters away (within the workplace)?
- use the "churning" method, cylinder slightly tilted
-in your hands
-on your shoulders
-on a special pallet

18. How far from the cylinders storage is it forbidden to smoke and use open fire?
-3 m
-5 m
-10 m
-20 m

19. Acetylene cylinder colour is...
-Black
-Red
-Blue
-White

20. Oxygen cylinder colour is...?
-Black
-Red
-Blue
-White

21. Which of the following ways to heat up a frozen transforming valve is prohibited?
- hot water
- steam
- fire
- warm sand

22. Point out a false safety requirement for oxygen cylinders transportation, loading/unloading
- Never lift a cylinder by the cylinder valves
- Never carry cylinders on your shoulders, back, rotate or turn them over, throw, push, or hit.
- It is allowed for loaders to work in oily clothes and wear gloves with oil stains
- Never place cylinders nearby heaters, hot pieces and furnaces or leave them unprotected in direct sunlight.

23. What will be the first step in administering first aid to a wounded person?
- dress the wound
- stop the bleeding
- clean the wound

24. A welding shield might have a small crack and still be usable.
- true
- false

25. Is it allowed to twist welding cables?
- Yes
- No

26. Residual gas pressure in oxygen cylinders should be?
- not less than 0,5 kg/cm3
- not less than 1 kg/cm3
- not less than 2,5 kg/cm3
- not less than 3 kg/cm3

27. Which of the statements is false?
- Caps should be in place if cylinder not in use
- Use a spanner wrench to get the cap off the cylinder
- When loading/unloading gas cylinders hold them upside down
- During transportation and storage caps should be on.

28. What shouldn’t you do if cylinders are leaning over in their pallet or storage bay?
- Straighten them by yourself before they fall
- Get help from your colleagues
- Make sure that cylinder restraints are securely fastened after moving cylinders

29. What should be the height of flash screens, which separate the welding area during arc welding?
- At least 1.8 m

- At least 2 m
- B At least 2.2 m

30. Walk towards the plant site along pedestrian walkways, if there are no pedestrian walkways, keep to the ... side of the road against the current of traffic
- right
- left

31. What helps to reduce the effect of occupational hazards?
- Using personal and collective protection equipment
- Following medical and sanitary advice
- Not overworking yourself
- All of the above

32. What can be used as a splint ...
- a ski pole, a board, a towel
- a piece of board, a tree branch, a ski
- a ski pole, a board, a towel, a flexible cable, a piece of board, a tree branch

33. What is the right way to store cylinders with base rings?
- In a strictly vertical position, using special devices to prevent the cylinder from falling down
- In a strictly horizontal position on special frames preventing the cylinder from toppling over
- Either in horizontal or in vertical position
- In horizontal position, at an angle of 30” to the floor

34. What information do you need to tell the dispatcher when calling a fire station in case of fire?
- Address of the site, number of casualties
- Address of the site, exact location of fire, number of casualties
- Address of the site, exact location of fire, your name and details
- Address of the site, exact location of fire, number of casualties, your name and details

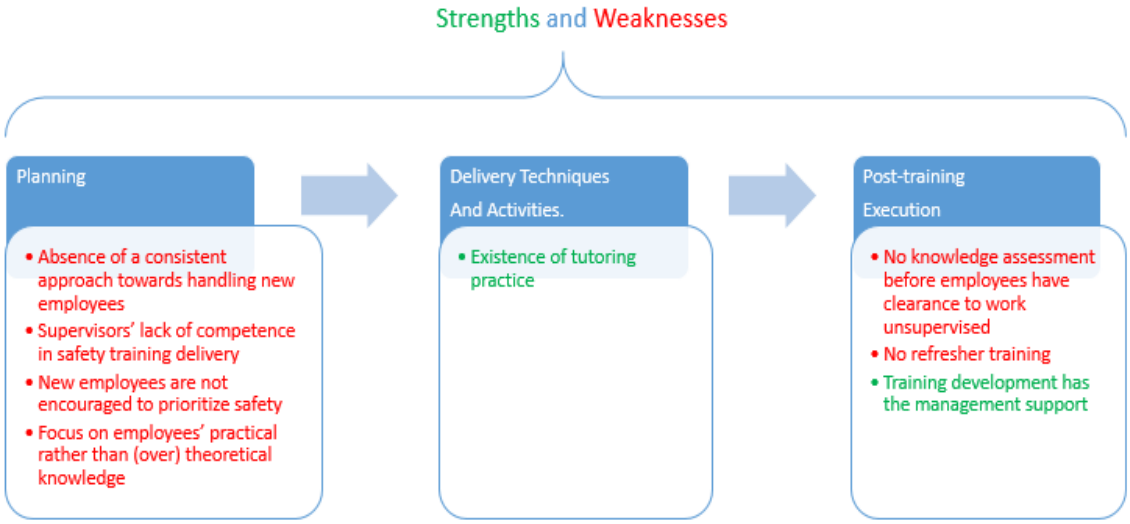
35. What is the first step in electric shock emergency?
- Call an ambulance
- Break the contact between the casualty and the source of shock by turning off the source of electricity
- Push the casualty at least 8 m away from the source of shock (cable or equipment)
- Start intensive care

36. In what type of bleeding does the blood spurt?

- Arterial bleeding
- Capillary bleeding
- Venous bleeding

Recommendations

Below are the strengths and weaknesses of the way new employees are being handled in your company. This summary is a result of the current state analysis.



The training on safe working practices, created during this study, is addressing the weaknesses and aims at providing a systematic approach towards training.
As part of research, some best practices from different sources have been studied on ways to make a safety training effective. Based on your company's specifics, here are some recommendations for trainers, process holders and management:

1) The training Power Point slides contain trainer notes. The trainer is recommended to interact with the audience and add a creative element to the presentation, such as some vivid examples from the plant. Relevant examples will illustrate the topics better and facilitate learning. Share your own experience, tell about the incidents or injuries you witnessed.
2) It is recommended that the pre-training evaluation should be done in the form of anonymous written quizzes. Clarify to the employees that they will take a training course soon and this test assesses their current level of knowledge. Use the five-mark grading system for assessment. The test's simplicity implies that after the training all the welding operators should know the correct answers to these questions.
3) A trainer's personality and his/her ability to deliver the training material are the critical factors impacting training effectiveness. It is recommended to give additional instructions to the future trainers and do the regular follow-up.
4) After training completion it is important that the new skills and knowledge are transferred into practice. Otherwise the training will only have a short-term effect. Therefore it is recommended that 1) the line managers should serve as models when they perform tasks themselves and follow all the requirements mentioned in the training. In order to do so, the line managers should have a thorough understanding of the training content and be able to relate it to the workplace. It would be good to make sure that the training is relevant and truly describes the safe working practices on site; 2) the company managers at all levels of responsibility should realise that they are accountable for ensuring safe working practices and support those employees who comply.
5) It is recommended to review the training once a year.