
K3-Based Welding Training as an Effort to Increase Work Safety Skills and Awareness in the Community

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Abstract

This training is a form of community service by tertiary institutions to improve human resources quality. Through this training, the community can increase their knowledge and skills in welding by occupational safety and health (K3) regulatory standards. This training consists of two stages: preparation and implementation of activities. The preparation stage includes the procurement of materials and guidelines for carrying out the welding process. At the same time, the activity implementation phase includes an explanation of occupational safety and health and welding training. The results of this training are expected to increase the public's knowledge and understanding of the importance of applying OHS in the welding process in the workplace.

Keywords: Training; K3; Welding.

1. Introduction

Welding is one of the most widely used joining methods in aluminium building construction and machinery. In addition to joining, welding can also be used for repairs or revisions, such as making hard assembly of tools or thickening worn construction parts. Even though it looks simple, the welding process involves many problems that must be overcome with solutions that require knowledge. This knowledge includes not only theoretical understanding but also requires professional skills.

The welding process is included in the material joining process. Welding is a process of joining metal or non-metal by heating the joining material to a certain temperature to produce fused parts, either with or without pressing and with or without fillers. According to DIN (Deutsche Industrie and Normen), welding is metallurgical bonding at alloy metal joints in a melted or liquid state. Welding is defined as joining certain surface parts of metallic or non-metallic materials resulting from heating the materials to a certain temperature, either with or without metal fillers, with a melting temperature that is not much different.

Welding poses a great risk to workers, such as producing loud noises, losing body fluids due to hot environments, electric shocks, eye injuries, unsafe working positions, fires and explosions. Welding can also produce impacts that can pollute the environment, such as dust, smoke, and gaseous pollutants. In addition to these general hazards, there are still hidden hazards, such as working with equipment that is not normally used, working in confined spaces, poor electrical or gas connections, hot metals and others.

The case example at the PT Citra Adi Sarana (CAS) Indonesia factory on June 8, 2021, shows how important it is to apply work safety in the welding process. The incident caused five workers to die while carrying out the tank welding process. Therefore, welder workers must be protected with personal protective equipment to avoid inhaling excess steam and gas from welding and cutting.

The use of air ventilation is essential to reduce the content of vapours and gases to non-hazardous levels. In addition, the use of air masks is also highly recommended



Figure 1. Welding Workshop Conditions

Based on Figure 1 above, it can be seen that the condition of the workshop does not apply K3 safety elements. Much equipment is not neatly arranged and does not work according to applicable standards, so there is a potential for work accidents to occur.

Based on the results of the situation analysis in the conditions of the welding workshop, several problems can be formulated, namely:

1. How to improve the quality of work according to welding standards?
2. How to improve the quality of work according to K3 standards in welding?
3. How to increase the capacity of work equipment according to welding standards?

2. Materials and Methods

The method used in this study consists of identifying the problems encountered and efforts to obtain results according to the problems that occur. These efforts include providing training, discussion, practice, and mentoring.

2.1 The material provided includes:

2.1.1 Classification Techniques

To support smooth, strong and efficient welding results, the things that must be considered include:

1. Welding parameters
2. Turning on and off the welding arc
3. Electrode movement
4. Welding technique

5. Joint Design (Joint Design)
6. Welding Position
- 2.1.2 Occupational Safety and Health Equipment in the Welding Process

1. Welding mask

Welding masks protect the head and hair from welding spatter, ultraviolet, infrared rays, gases, and other objects. The glass window of the welding mask consists of three layers of coloured glass flanked by white glass.

2. Leather Gloves

Welders must wear leather gloves because they are exposed to heat and electric current. Hand contact with heat often occurs through both hands.

3. Leather Apron

The leather apron protects the welder's body from the sparks that come out during the welding process. Using a leather apron must be done to protect the worker's body.

4. Safety Glasses or Protective Glasses

Safety goggles are used to protect the eyes of the welder when cleaning the slag and also from splashes that arise when grinding.

5. Safety shoes

Safety shoes protect the welders' feet from hot objects and sharp objects around the work area.

3. Results

Based on the discussion above, this chapter will explain the results of implementing occupational health safety at Imin's workshop. From the results of this application, workers can understand the methods of the welding process by regulatory standards. Welding workers also know the importance of implementing occupational health safety in the field by regulatory standards.

The type of welding commonly applied in construction engineering is arc welding or SMAW (Shielded Metal Arc Welding) or electric welding. This type of welding is widely used because the process is very easy, easy to operate, can be used for various welding positions, and is very effective. However, in previous observations, the builders or welding workers did not implement occupational health safety (K3). This will result in the risk of accidents in the workplace even though the application of occupational health safety is implemented in all aspects of work, one of which is welding work.

Welders can only use this type of electric welding. This causes the workers' ability to be hampered, which will also affect work limited to welding fences, canopies, and other types of welding that cannot be done. Therefore, in this activity, the workers will be given special education and training regarding applying occupational health safety (K3) in the workplace, such as using personal protective equipment, including welding masks, gloves, leather jackets or aprons, and safety shoes. This will provide awareness that applying OSH in the workplace is very important.

In the electric welding process, the welder needs to pay attention to the quality of the welding result, which not only depends on the implementation but is also determined by the preparation before welding. Therefore, welding supervision is carried out since preparation for welding, at the time of welding, and after welding. In addition to the welding current, the type and diameter of the electrode must also be considered, and it needs to be adjusted to the material to be welded.

At the same time, in gas welding, it is necessary to consider that the welding flame passes through a proportional valve which regulates the amount of oxygen and acetylene. To avoid somethings unwanted things, such as gas leaks resulting in an explosion, then need to pay attention the gas cylinder that will be used must be placed in a safe place so that it is not exposed to sparks from welding.

4. Discussion

The discussion above shows that applying occupational health safety (K3) in welding is very important. This can be done by providing special education and training to welders regarding applying OSH in the workplace, especially in using personal protective equipment such as welding

masks, gloves, leather jackets or aprons, and safety shoes. With good K3 implementation, it is expected to reduce the risk of accidents that will occur in the workplace.

However, in previous observations, the builders or welders did not apply K3 in the welding process. This is, of course, very dangerous because it can lead to accidents that will occur in the workplace. Therefore, efforts are needed to increase the awareness of welding workers about the importance of applying K3 in the welding process.

In addition, the discussion above also shows that the ability of welders is limited only to types of electric welding. This will affect work limited to welding fences, canopies, and other types of welding that cannot be done. Therefore, efforts are needed to improve welders' ability to perform other types of welding.

Several factors must be considered in the electric and gas welding process to optimize the welding results. These factors include welding current, type and diameter of electrodes, welding flame, and placement of gas cylinders. By taking into account these factors, it is expected that welding results can be optimal and minimize the risk of accidents that will occur.

5. Conclusions

Applying occupational health safety (K3) in welding is important to the discussion above. From the results of implementing K3 at Imin's workshop, the workers could understand the welding process methods by regulatory standards. Welders also know that it is important to implement K3 in the field according to regulatory standards.

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