Identification Of Potential Hazards In The Welding Room In Workshop W2 Using The Hira Method

Jeremia Rossandro Panjaitan[1], Ita Wijayanti[2] and Wowo Rossbandrio[3]

{jeremiarossandro26@gmail.com[1], ita.wijayanti@polibatam.ac.id[2], wowo@polibatam.ac.id[3]}

Politeknik Negeri Batam, Mechanical Engineering Study Program, Indonesia[1,2],
Politeknik Negeri Batam, Aircraft Maintenance Engineering, Indonesia[3]

Abstract. Risk management is a part that is needed for every agency with risk management in an agency, the agency can prevent risks that can harm the agency. The importance of risk management in the welding room is to find out how much potential danger in Workshop W2. Hazard Identification and Risk Assessment (HIRA) is a process to analyze the existence of a hazard then calculate the magnitude of a risk and evaluate whether the risk is small or large. The purpose of this research is to identify potential hazards and conduct a risk assessment at Workshop W2 using the HIRA method. Data collection is done by direct observation. Then presented in the form of tables and flow charts that refer to the Risk Assessment standard AS/NZS 4360: 1999. The results showed that the potential hazards that often occur in the W2 workshop are exposure to fume and the effects of light radiation which can interfere with the respiratory tract and can endanger eye health.

Keywords: Risk management, HIRA, Workshop

1 Introduction

A work accident is an unexpected event that can result in injury, disability, or death due to the work environment not paying attention to occupational health and safety (K3) standards. Occupational health and safety (K3) is to see that every workforce has occupational health and safety guarantees. The meaning of K3 is not fully understood by both management and workers, because many workers do not understand and understand the importance of K3, the importance of K3 for every worker to ensure and prevent work accidents and occupational diseases so as to improve the welfare of life and productivity. For this reason, various real efforts are needed to increase awareness of the importance of OSH, a real effort is made through education. Education that implements efforts to encourage a culture of K3 is industry-based and applied education. The importance of OHS in the welding lab is to prevent and reduce the risk of work accidents. Lack of awareness in students is like the equipment and equipment that has been provided is not used by students which has fatal consequences. [1]

There are several methods that can be used to identify potential hazards, such as Hazard Identification and Risk Assessment (HIRA), Job Safety Analysis (JSA), Hazard and Operability (HAZOP).

Hazard Identification and Risk Assessment (HIRA) is a method to identify the presence of a hazard by assessing the risk and calculating whether the risk is acceptable or not. The HIRA method is needed because by using this method we can find out and reduce and even eliminate

ICAE 2023, November 07, Batam, Indonesia

DOI 10.4108/eai.7-11-2023.2342952

hazards, besides that the advantage of using the HIRA method is that we can investigate work accidents and find what efforts to overcome these accidents. [2]

A) The purpose of this study is to identify potential hazards and conduct a risk assessment in Workshop W2.

B) The benefits of this research are

a). As input to improve learning methods in Workshop W2 that contain aspects of knowledge, work attitudes in accordance with the standards applied.

b) As input to reduce potential hazards that often occur in Workshop W2 and follow safety standards in the field.

2 Research Methodology

The potential hazard identification and risk assessment method used in this research is the HIRA method. The HIRA method consists of stages:

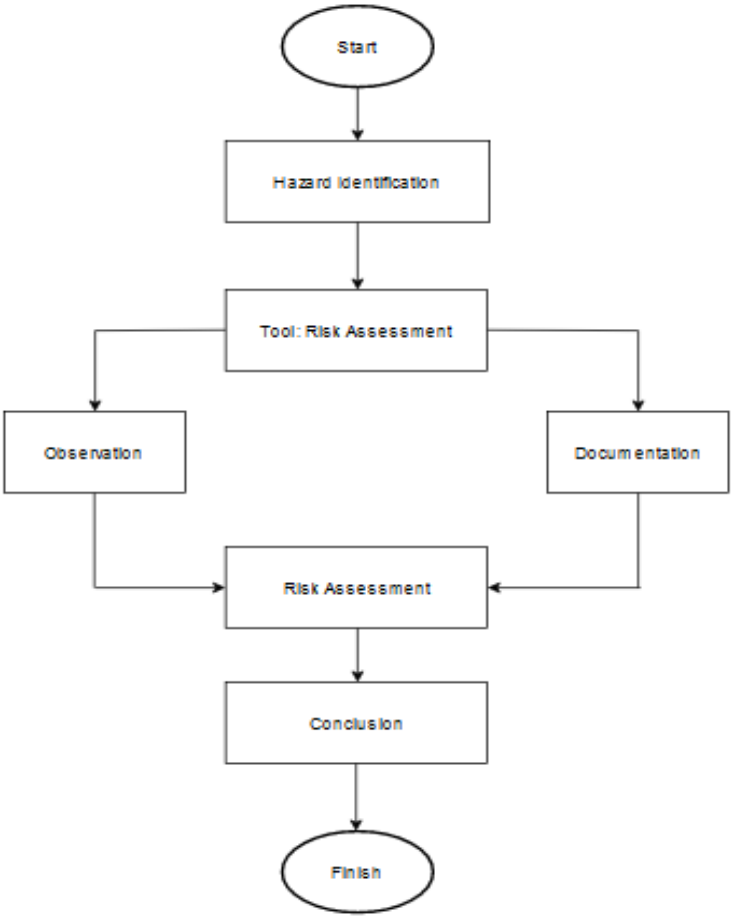

Fig 1. Research Flow Chart

The research was conducted in the welding workshop. The scope of the research includes identification of potential hazards, risk assessment, and determination of the level of potential hazards in Workshop W2. There is one type of data collected in this research, namely primary data, which is obtained through observation. Observations were made to determine the potential hazards, the magnitude of the hazard risk and the environmental conditions in Workshop W2.

Data processing and analysis techniques carried out are guided by observation data after the data is collected, risk assessment and risk control are carried out. Hazard identification is an effort to find out, recognize the existence of hazards in a system and risk control is the process of assessing a risk by comparing the level and risk criteria that have been determined based on the OHSAS 18001: 2007 source. In table 1, the severity classification (Severity) is presented, table 2 is presented the frequency classification of opportunities (Likelihood), and in table 3 the Risk analysis matrix is presented, as well as the level and priority of risk shown in table 4.

Table 1. Severity Classification (*Severity)*

Description	Level	Description
Insignificant	1	No Injuries
Minor	2	Minor injuries First aid
Moderat	3	Moderate injury Requires medical attention Reduced organ function Requires temporary rest
Major	4	Severe injuries Organ loss Need time to rest

Source : AS/NZS/ 4360: 1999

In determining the risk level assessment of the severity of hazards in this study, the authors collected data in observations in Workshop W2, then found out the severity level. *(Severity)*.

Table 2. Frequency Classification Chance *(Likelihood)*

Description	Level	Description
Almost certain	E	Occurs repeatedly
Likely	D	It might happen
Posible	C	Occurs over a period of time
Unlikely	B	May occur at any time
Rare	A	Extraordinary conditions may occur

Source : AS/NZS 4360: 1999

Table 3. Risk Rating

	Severity (S)				
Likelihood (L)	1	2	3	4	5
Almost Certain (A)	1A	2A	3A	4A	5A
Likely (B)	1B	2B	3B	4B	5B
Moderate (C)	1C	2C	3C	4C	5C
Unlikely (D)	1D	2D	3D	4D	5D
Rare (E)	1E	2E	3E	4E	5E

Source : AS/NZS 4360: 1999

Taking the frequency value of how often potential hazards occur, the author divides 5 levels in 1 month, namely 4 weeks, then in 4 weeks is divided into 4 levels. After that, the author took data in the form of the number of times the hazard occurs within a period of 1 month by making observations when students are practicing in Workshop W2, when students are practicing in Workshop W2, then the average likelihood value is obtained.

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Description :

	Extreme
	High Risk
	Moderate
	Low Risk

Table 4. Risk Analysis Matrix

Severity x Likelihood	Description
3A, 4A, 4B, 4C, 5A, 5B, 5C, 5D	Unacceptable. Activities stop top management involvement
1A, 2A, 2B, 3B, 3C, 4D, 4E, 5E	Undesirable (management activity decision required, immediate response required.
1B, 2C, 3D, 3E	Acceptable review of material management activities
1C, 1D, 1E, 2D, 2E	Acceptable without review.

Source : AS/NZS 4360: 1999

Description of risk analysis matrix

L X S= Relative Risk

L= *(Likelihood)*

S= *(Severity)*

Risk score	Rating
0-3	Low
4-6	Medium
6-9	High
10-16	Very High

Risk analysis matrix is an explanation of the risk that can be accepted or not the risk is then taken action against the risk. From table 3 above we can see the hazards and place the hazards into the hazard level group, in table 3 contains an explanation of the level and level of all hazards that occur for the potential hazard process contained in the welding workshop can be continued in the test data.

3. Data Analysis and Discussion

Based on the observation of the activities carried out in the welding room in Workshop W2, as follows.

1. Material lifting

The initial stage of lifting materials is to move or lift materials into the w2 workshop to be arranged or tidied up the process of lifting materials using forklifts and hands. In the process of lifting materials using a forklift there are hazards that can threaten health and safety. The danger that may occur is the fall of the material the danger of falling the material is very fatal the risk can result in fractures and death.

In the process of lifting materials by hand, there are hazard factors that can threaten health and safety. The danger that may occur is the fall of the material and not wearing gloves is very risky can result in lacerations.

2. Use of plasma cutting

In material cutting activities using flasma cutting, there are potential hazards that can threaten health and safety such as exposure to flasma light, exposure to fume, sparks.

The danger of exposure to flasma cutting light during cutting is that the flasma light can be dazzling. If the intensity of the flasma light is too high, it can cause eye irritation. The danger of fume exposure when cutting flasma cutting emits fume / fume exposure fume can cause respiratory tract infections.

The danger of sparks when cutting flasma cutting emits sparks, these sparks are included in the category of fire safety hazards if they hit humans will cause burns. In addition, if the sparks hit flammable materials and explosive materials, it can cause fires and explosions.

3. Use of grinding machine

During the process of using the grinding machine, sparks will appear due to friction between the grinding machine and the material. These sparks are a fire safety hazard. Therefore, when grinding, you are required to wear a coverall/APD to protect yourself from grinding sparks.

4 Welding

In the welding process, there are many potential hazards that threaten occupational health and safety when welding to connect the material, there will be light from the welding process. This light exposure is very dazzling when it hits the eyes, this danger will be more risky if when welding does not use PPE to protect itself from exposure to welding light. When welding without using PPE, namely faceshield / welding cup, the welding light exposure received will directly hit the cornea to the retina so that the risk of eye fatigue due to exposure to welding light is even greater.

In addition to causing light, welding creates fume / smoke from the welding process. Fume is a small particle less than 1 micro in size that comes from metal vapor. Exposure to fume can cause respiratory infections.

The danger of welding sparks is a category of occupational safety hazards of the fire hazard type of sparks are included in the type of fire hazard because if the sparks hit flammable and explosive materials the sparks can cause fires and explosions.

Table 5. Table of Risk Assessment Results of observations of potential hazards in the Welding Room.

Activity	Hazard	Risk	Consequence	Risk Assessment Matrix		
				L	S	RR
Material Lifting	- Weight of material being lifted - Not wearing gloves	- Falling on students - Injuries caused by sharp materials	- Bone fractures - Laceration	2 2	E D	2E (Moderate) 2D (Low Risk)
Use of Plasma Cutting	- Sparks - Plasma light - Fume	- Sprinkled with fire - Exposed to light - Exposed to fume	-Burns -Eye irritation -Respiratory infection	2 3 2	E C A	2E (Moderate) 3C (Moderate) 2A (High Risk)

Grinding Machine Usage	- Sparks - Grinding blades - Noise	-Sparked by fire - Exposed to grinding machine blades - Exposure to noise	- Burns - Scratched - Lack of hearing	2 2 2	E E A	2E (Moderate) 2E (Moderate) 2A (High Risk)
Welding	-Welding light -Fume -Welding spatter	-Exposure to welding light -Exposed to fume -Sparked by fire	-Eye irritation/red eye -Respiratory infection -Burns	2 2 2	A A A	2A (High Risk) 2A (High Risk) 2A (High Risk)

Description of risk assessment value:

L = *(Likelihood)*

S = *(Severity)*

RR = *(Risk Relative)*

Based on the results of determining the level of risk which is the result of observing the average activity of potential accidents totaling 11 risks in 4 potential hazard activities in the welding room, there are 1 type of risk in the low risk category, 5 types of risk in the moderate risk category and 5 types of risk in the high risk category. Potential hazards according to the low risk category are found in material lifting activities, moderate categories are found in activities using plasma cutting, using grinders and welding, high risk categories are found in welding activities.

Based on the potential hazard identification table, it is known that there are 11 potential hazards with 11 risks in 4 activities. From the data collected, the potential hazards that often occur are sparks, exposure to fume and welding/flasma light. These potential hazards consist of the activities of using plasma cutting, using grinding machines and welding. These potential hazards occur very frequently in the w2 workshop.

5 Conclusion

Potential hazards identified in the welding room in workshop w2 are 11 potential hazards with 11 risks in 4 work activities which include lifting materials, using plasma cutting, using grinding machines, welding.

Based on the results of the risk assessment, of the 11 risks in 4 potential hazard activities in the welding room, there is 1 type of low risk category, 5 types of moderate risk categories and 5 types of high risk categories.

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