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Efforts to Control Work Accident Risks in Steel Construction Work Using the Job Safety Analysis (JSA) Method. (Case Study at Pt. Xyz)

Muhammad Abdan Syakuro Billah[1], Akhmad Wasiur Rizqi[2], Moh. Jufriyanto[3]
[1.2.3]Industrial Engineering Study Program, Faculty of Engineering, University of Muhammadiyah Gresik
Jl. Sumatra No.101, Mount Malang, Randuagung, Kebomas District, Gresik Regency, East Java, 61121
Email: Abdanscr@gmail.com

ABSTRACT

PT. XYZ is a PT engaged in general contracting, outsourcing, trading and services. In the company there are several workers who had work accidents. According to existing data for 2021-2022 in fabrication work, most accidents are related to negligence of workers at PT. XYZ, namely in the grinding process from being cut to tripping over cables, so the authors conducted this research aiming to reduce and minimize work accidents of workers in the workplace. This research was conducted by measuring accidents in every activity at PT. XYZ. Data processing is done by calculating the level of risk assessment, then determining the level of efficiency to be achieved using the Job Safety Analysis (JSA) method. The results of the risk assessment for each job show that there is one highest level of risk, namely in the drilling section with a likelihood value of three and a severity level of four. From the results of risk control in the fabrication process, it can be carried out by means of technical control (repairing or adding technical equipment such as installation Occupational Health and Safety signs), administrative control (briefing before work, using special tools to lift materials), and using PPE. Proposed improvements that can be given are the addition of several personal protective equipment suitable for work at the fabrication site, namely the use of gloves, wearing masks, gloves, safety shoes and welding goggles. From the results of risk control in the fabrication process, it can be carried out by means of technical control (repairing or adding technical equipment such as installing K3 signs), administrative control (briefing before work, using special tools to lift material), and using PPE. Proposed improvements that can be given are the addition of several personal protective equipment suitable for work at the fabrication site, namely the use of gloves, wearing masks, Occupational Health, and Safety signs), administrative control (briefing before work, using special tools to lift materials), and using PPE. Proposed improvements that can be given are the addition of several personal protective equipment suitable for work at the fabrication site, namely the use of gloves, wearing masks, gloves, safety shoes and welding goggles.

Keyword: JSA, Fabrication, Work Accident

Introduction

The role of humans in the company cannot be separated from the dangers of work accidents. Many factors can influence the occurrence of work accidents such as wrong working methods, unsafe work environment, PPE which is inadequate. The impact of work accidents also varies, ranging from minor accidents such as tripping to major accidents such as fires that cause death[1]-[2]

Risk is something that is often attached to every activity in a job. In the field of K3, risks that have the potential to cause large losses are things that must be controlled because they can threaten the safety of employees. Risks can be avoided by carrying out potential countermeasures so that the impact can be reduced[3]-[4]

The level of risk that is known before it occurs is very important in controlling risk. In tackling OHS risks, risk management is carried out to prevent accidents and minimize risks that occur due to work accidents. Risk management is a risk management activity that aims to prevent unwanted work accidents in detail, complete, planned and structured in a good system.[5].Based on[6]in 2021 there are 82 thousand cases of work accidents in Indonesia. To reduce the number of work accidents, it is necessary to hold a work accident prevention program, namely by implementing Risk Management to find out the dangers and potential magnitude of risks that exist in the workplace which currently do not exist in the company. So that preventive measures and control can be taken against these hazards, as an effort to protect company assets from damage, production disruptions, losses and additional costs incurred.[7]-[4]

Occupational accidents are incidents that are unintentional and unwanted, small accidents are often underestimated even though small accidents are the beginning of fatal accidents.[8]. Accidents that occur in a work relationship are called work accidents, meaning that accidents occur due to work, both occurring at work

and when leaving/returning from work. In this case work accidents can occur due to hazardous conditions related to machines, work environment, production processes, the nature of work, and work methods. Occupational accidents can also occur as a result of dangerous actions which in some cases can be motivated by a lack of knowledge and skills, bodily defects, fatigue and tiredness/sluggishness, unsafe attitudes and behavior.[9]-[10]

Occupational safety and health (K3) is an integral part of the employment system which is directly related to human resources.[11]. With K3 the company can minimize accident cases that result in material losses and casualties. At this time all industrial companies are required by the government to always pay attention to Occupational Health and Safety K3. Because safety and health K3 is one of the important factors that can affect employee work productivity. The risk of work-related accidents or illness often occurs because the K3 program is not running well. This can have an impact on the level of employee productivity[12]-[13]

PT. XYZ which is located on Jl. Betoyo Kauman No.KM 12.5 Kec.Manyar Gresik Regency, East Java 61151 Is a company engaged in the implementation of steel plate construction and fabrication services. In its implementation, PT. XYZ more often gets tenders on steel plate fabrication work. In steel plate fabrication work, workers are directly involved in marking, cutting, grinding, drilling, welding and painting activities which have a high and dangerous risk of work accidents. The K3 division at this company still uses assistance from external parties, so it does not have a good administrative record regarding work accidents in the fabrication process, this company already has a minimum PPE completeness standard such as gloves, welding goggles, special safety shoes, sandblasting masks, and safety shoes. helmet.

This research was conducted to identify the hazards of work risks that occur, calculate the value and level of the highest work risks found in the production area at PT. XYZ.

Research methods

Job Safety Analysis (JSA) is an analytical technique used to identify the hazards present in a person's job and develop ways to reduce the risk of accidents.[14]

The purpose of this JSA method is to identify potential hazards in each work activity[13]. JSA is also used to eliminate or prevent hazards to occupational safety and health in the workplace and to support more effective working methods[15] -[16]

The steps in conducting a Job Safety Analysis are as follows[17]:

a. Select the job to analyze
b. Breaking work down into activity steps
c. Identify potential hazards at each step
d. Identify the risks in each potential hazard

The application of occupational safety and health in companies is important to create a safe work environment and reduce the number of work accidents. By establishing systematic work operations, establishing correct work procedures, and ensuring that every worker has received proper training, occupational accidents and diseases can be prevented. results at work[18]-[19]-[20]

To conduct this research, what the authors did was to make direct observations on the fabrication section at PT. XYZ regarding the problems in that section. The first stage is to identify the problems that exist in PT. XYZ which will be solved through research conducted. Then formulate conflicts that occur in the field so that the research carried out can run smoothly with the desired goals.

The formulation of the problem is adjusted to the needs in the field, namely for OSH research using the JSA method. after identifying and formulating the next problem is to determine research objectives, so that researchers are more focused on finding data, solutions and contributions within the company. The next stage is the reference search stage. It can be from books, journals, and pre-existing research. Field survey to see directly the field situation in the maintenance process At this data collection stage, the data needed to overcome data problems is collected in the form of work accident data and direct observation. After field studies, namely the author performs data processing using the Job Safety Analysis (JSA) method, the data obtained from the data collection process is processed by providing suggestions for improvements with JSA to minimize work accidents. the last is Conclusion At this stage the researcher draws conclusions from the results of the analysis of data processing using the JSA method. Field survey to see directly the field situation in the maintenance process At this data collection stage, the data needed to overcome data problems is collected in the form of work accident data and direct observation. After field studies, namely the author performs data processing using the Job Safety Analysis (JSA) method, the data obtained from the data collection process is processed by providing suggestions for improvement with the JSA to minimize work accidents. the last is Conclusion At this stage the researcher draws conclusions from the results of the analysis of data processing using the JSA method. Field survey to see directly the field situation in the maintenance process At this data collection stage, the data needed

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Results and Discussion

From the results of observations that occurred in the field, there are hazards in the fabrication process which consists of marking, cutting, grinding, drilling, welding and painting processes at PT. XYZ. Then the likelihood value and severity level can be determined to determine the risk value to get the risk level.

Risk = likelihood x severity

Table1 Results of Hazard Identification In the fabrication process

Process	Rare Jobs	Danger	Stake
mark	Draw a pattern on the material	Worker cutting steel plate	Scuffs, scratches
		Worker trips over steel plate	Bruises, abrasions, lacerations
		Backache workers	Twisted back
Cutting	Lifting material	Workers experience muscle cramps when loading material into the cutting machine	Cramps, sprains
	Prepare the machine	Tripped over the cord	Cuts, bruises, sprains
	Cut the material according to the pattern already in the picture	Worker's hand is scratched by cutting machine	Scratches
		Workers experience noise	Hearing disorders
grind	Laying material	Worker cutting steel plate	Scuffs, scratches
		The worker is crushed by the material to be moved	bruises
	Get your grinder ready	Worker trips over grinding machine cable	Bruises, sprains
		The worker is electrocuted	Burns
	Flatten the cut plate	Worker's hand is scratched by a grinder	Wounds, scratches,
		Workers inhale dust from cutting	Shortness of breath, cough
		Workers are splashed with steel plates that bounce off during the grinding process	Bruises, abrasions
		The worker was hit by a grinding knife	Scratch wound
Drilling	Laying material	Worker squeezed material	Bruises, abrasions, broken bones
		Backache workers	Back pain

Process	Rare Jobs	Danger	Stake
welding	Make a hole in the plate	Worker trips over drill string	Sprains, abrasions
		Workers exposed to splash gram	Scuffs, scratches
	Prepare the welder	worker trips over welding cable	Blisters, bruises
	Welded steel plate	Workers inhale welding fumes	Out of breath
		Workers exposed to welding fire	Burns, burns
		Workers exposed to welding radiation	Damage to eyes and skin
painting	Painting all materials	Worker painting too close	Dizziness, fainting

Risk assessment is obtained using a risk management approach, namely by determining the value of the risk score by multiplying the probability value with the risk severity level of the hazard that has been identified in the fabrication process. With the value of the risk score, the risk level of the identified hazard will be determined

Data processing

Table2*Risk control in the fabrication process*

Process	Rare Jobs	Danger	Stake	Risk level	Risk control		
					Technical control	Administrative control	PPE
mark	Draw a pattern on the material	Worker cutting steel plate	Scuffs, scratches	R		Giving directions, providing first aid, Giving sanctions to workers who do not use PPE	Gloves, safety shoes
		Worker trips over steel plate	Bruises, abrasions, lacerations	R		Giving directions before work, placing steel plates according to their place, Giving sanctions to workers who do not wear PPE	Safety shoes
		Backache workers	Twisted back	R		Briefing before work, Providing First Aid	
Cutting	Lifting material	Workers experience muscle cramps when loading material into the cutting machine	Cramps, sprains	R		Briefing before work, using special lifting equipment to lift material, Providing First Aid	
	Prepare the machine	Tripped over the cord	Cuts, bruises, sprains	S		Make a special place for laying the cable cutting machine	
	Cut the material according to the pattern already in the picture	Worker's hand is scratched by cutting machine	Scratches	M		Giving directions, Providing first aid, Giving sanctions to workers who do not use PPE	Safety gloves
		Workers experience noise	Hearing disorders	L		Briefing before work, providing K3 training, giving sanctions to workers who do not use PPE	Earmuffs Earmuffs
grind	Laying material	Worker cutting steel	Scuffs, scratches	L		Giving directions, Providing first aid,	Safety gloves

Process	Rare Jobs	Danger	Stake	Risk level	Risk control		
					Technical control	Administrative control	PPE
		plate				Giving sanctions to workers who do not use PPE	
		The worker is crushed by the material to be moved	bruises	L		Briefing before work, Using special lifting equipment to lift material, Providing First Aid	Safety shoes
	Get your grinder ready	Worker trips over grinding machine cable	Bruises, sprains	M		Make a special place to put the grinding machine cable	
		The worker is electrocuted	Burns	L		Check the grinding machine cable regularly and ensure the cable is safe when used. Additional company healthcare services	
	Flatten the cut plate	Worker's hand is scratched by a grinder	Wounds, scratches,	L		Using a grinding machine that is in good condition and according to standards	
		Workers inhale dust from cutting	Shortness of breath, cough	L		Briefing before work, forming a K3 division, imposing sanctions on workers who do not use PPE	Wear a protective mask
		Workers are splashed with steel plates that bounce off during the grinding process	Bruises, abrasions	L		Briefing before work, Grinding according to SOP, Gives strict sanctions if not doing work according to SOP	Safety shoes, goggles
		The worker was hit by a grinding knife	Scratch wound	L		Breefing before work Checking the grinding of the cutting knife before work and ensuring the cutting knife is safe to use	
Drilling	Laying material	Worker squeezed material	Bruises, abrasions, broken bones	H	Post a pinch hazard K3 sign in the work area where there is a potential pinch hazard	Briefing before work, Using special lifting equipment to lift material, Providing First Aid	

Process	Rare Jobs	Danger	Stake	Risk level	Risk control		
					Technical control	Administrative control	PPE
		Backache workers	Back pain	L		Briefing before work, Using special lifting equipment to lift material, Providing First Aid	
	Make a hole in the plate	Worker trips over drill string	Sprains, abrasions	L		Make a special place for laying the drill machine cable	
		Workers exposed to splash gram	Scuffs, scratches	L		Briefing before work, Providing First Aid, Establishing K3 Division, Providing sanctions for employees who do not use PPE, Increasing health services	Safety gloves, safety shoes, goggles
welding	Prepare the welder	worker trips over welding cable	Blisters, bruises	L		Make a special place for laying the welding machine cable	
	Welded steel plate	Workers inhale welding fumes	Out of breath	L		Briefing before work, Providing First Aid, Imposing sanctions for employees who do not use PPE, Forming a K3 Division, Adding company health services	Face mask
		Workers exposed to welding fire	Burns, burns	M		Briefing before work, Giving first aid, Giving sanctions to employees who do not use PPE	Safety gloves
		Workers exposed to welding radiation	Damage to eyes and skin	M		Not doing continuous welding work within 2 hours, Resting gradually, Adding company health services	Welding masks/covers
painting	Painting all materials	Worker painting too close	Dizziness, fainting	L		Briefing before work, Not doing sandblasting work continuously within a maximum of 2 hours, Providing First Aid, Establishing an OHS Division, Adding company health services	Face mask

Results Analysis

Based on the results of data processing, we get the risk level in the fabrication process at PT. xyz as follows:

a. In the marking process there are risks that are included in the low category where the low level of risk indicates an acceptable level of risk and direction is needed
b. In the cutting process there is a low risk of moderate risk. a low risk level indicates an acceptable level of risk and direction is needed, a moderate risk level where action is needed to reduce risk.
c. In the grinding process there is a moderate risk. a low risk level indicates an acceptable level of risk and direction is needed, a moderate risk level where action is needed to reduce risk.
d. In the drilling process there is a high risk. a low risk level indicates an acceptable level of risk and direction is needed, a high risk level indicates that treatment must be carried out immediately
e. In the welding process there is a moderate risk. a low risk level indicates an acceptable level of risk and direction is needed, a moderate risk level where action is needed to reduce risk.
f. In the painting process there are risks that are included in the low category where the low risk level indicates an acceptable level of risk and direction is needed

Conclusion

From the results of the risk assessment for each job, there is one highest level of risk, namely in the drilling section with a probability value of three and a severity level of four. The results of risk control in the fabrication process can be carried out by means of technical control (improving or adding technical facilities or equipment such as adding K3 signs), administrative control (risk control by making rules, procedures, work instructions that are safer or healthier). checks), and the use of personal protective equipment.

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