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Risk Analysis of Occupational Accident in Warehousing with Hazard Identification, Risk Assessment, and Risk Control Methods at PT XYZ

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ABSTRACT

In the fertilizer manufacturing industry, there are activities in the warehousing area where the industry and this work area have a high work risk so that it needs to be controlled so that the workplace is safe and workers are avoided from various work accidents. Therefore, the purpose of this study is to analyze the risk of work accidents and make appropriate control of risks in the warehousing area of the fertilizer manufacturing industry. The methods used in controlling the risk of work accidents in this warehousing area are Hazard Identification, Risk Assessment, and Risk Control. The results of the study were seventeen (17 risks), with a risk level of 88% in the medium category and 12% in the high category in activities related to the use of forklift lifting equipment.

Keywords: *Hazard Identification, Risk Assessment, and Risk Control (HIRARC), Occupational accident, Occupational Safety and Health Management System, Risk.*

Introduction

One of the industries found in Indonesia and has a high level of occupational risk is the fertilizer manufacturing industry. PT XYZ is a company engaged in the manufacture of fertilizers and has several facilities, one of which is a warehouse and has a number of workers in 2023 of more than 1000 people. According to Dahliyah Hayati (2020) explained that: "Warehousing is one of the important parts of the company to support the process of production activities. The risk of hazards or work accidents is also quite high in the warehouse, this is due to the large number of goods stored or caused by the flow of goods and work tools used".

Based on the Regulation of the Peraturan Menteri Ketenagakerjaan Republik Indonesia Nomor 26 Tahun 2014 concerning the Implementation of the Assessment of the Implementation of the Occupational Safety and Health Management System, that, every company is obliged to implement the Occupational Safety and Health Management System which is integrated with the system in the company, in addition, this obligation applies to companies that employ at least 100 (one hundred) workers/laborers; or have a high level of potential danger. One of the objectives of the implementation of the Occupational Safety and Health Management System is to create a safe workplace and prevent and reduce occupational accidents and diseases that can occur to workers.

One of the things that must be done by companies referring to Government Regulation of the Peraturan Pemerintah Republik Indonesia Nomor 50 Tahun 2012 concerning the Implementation of the Occupational Safety and Health Management System is to make potential hazard identification, assessment, and risk control. Hazards and Risks are always present in the workplace, therefore it is necessary to take control measures.

The purpose of this study is to analyze the risk of work accidents and make appropriate control of risks in the warehousing area in the fertilizer manufacturing industry. The steps in this HIRARC method are to identify hazards, assess risks, and create controls.

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Research Methods

HIRARC is a method that aims to identify, analyze hazards and risk control techniques used to review systematic processes or operations in a system, risk variables will be obtained using the HIRARC method after which risk assessment and risk control can be carried out to reduce exposure to hazards contained in each type of work. This method has an important component for assessment to recognize existing hazards, evaluate the possibility or chance of occurrence, and recommend relevant controls Hazard Identification (Sofyan H, 2022).

In the HIRARC method, the first step is to identify hazards, after which it is carried out with a risk assessment. In risk assessment, a risk assessment scale based on likelihood and severity or consequence is used as in the following risk matrix:

Table 1. Risk Matrix

Likelihood						
	Almost certain	5	5 Medium	10 Medium	15 High	20 High	25 High
	Likely	4	4 Medium	8 Medium	12 Medium	16 High	20 High
	Possible	3	3 Low	6 Medium	9 Medium	12 Medium	15 High
	Unlikely	2	1 Low	4 Medium	6 Medium	8 Medium	10 High
	Rare	1	1 Low	2 Low	3 Low	4 Medium	5 High
			1	2	3	4	5
			Insignificant	Minor	Moderate	Severe	Catastrophic
			Severity				

After a risk assessment is carried out, the next step is to control the existing risks. Risk control can be carried out by referring to the risk control hierarchy, that is, elimination, substitution, engineering engineering, administration, and personal protective equipment as the lowest hierarchy.

Results and Discussion

The results of the research conducted on PT XYZ are as follows:

Table 2. Activity Identification and Risk Assessment in Spare Parts Warehousing

Activity	Risk	Because	Existing Control	L	C	LxC	Risk Level
Forklift Usage	Lifting failure	There is an imbalance when the spare parts are reduced	1. Procedure/WI-WI Storage and maintenance of motorcycles - Procedures for receiving non-raw material goods 2. Use of PPE (Safety Shoes, Safety Helmets, Gloves, Safety Glasses) 3. Safety Talk 4. SIO Forklift Operator 5. Lifting Equipment Certification 6. P2H 7. Preventive program/predictive maintenance program	2	5	10	HIGH
		Malfunction in equipment		2	5	10	HIGH
Use of stairs	Falling from a height	Storage of spare parts on the shelf	1. Education on how to go up and down ergonomic stairs 2. Modification of the shape of the stairs 3. Safety talk	2	3	6	MEDIUM
	Ergonomics related to work positions	Going up and down stairs		2	3	6	MEDIUM
The use of trolly	Occupational muscle fatigue	Material loads that exceed the capacity of the haul load	1. Periodic health checks 2. P2H 3. Safety talk	3	3	9	MEDIUM
	Bumping into materials	The trolly pace is out of control	1. Use of PPE (safety shoes, safety helmet) 2. Safety talk	2	2	4	MEDIUM
Manual handling	Hit by *spare parts*	The load that the worker lifts exceeds 20 kg	1. Use of PPE (safety shoes, safety helmet) 2. Safety talk	3	4	12	MEDIUM
	Clamped spare parts			3	4	12	MEDIUM
	Workers experience changes in posture		1. Periodic health checks 2. Safety talk	4	3	12	MEDIUM
Preparation of spare parts	Workers experience changes in posture	Unsuitable working position	1. Periodic health checks 2. Safety talk	2	3	6	MEDIUM
	Hit by spare parts	Smooth worker's hands	1. Use of PPE (safety shoes, safety helmet)2. Safety talk	2	3	6	MEDIUM

Activity	Risk	Because	Existing Control	L	C	LxC	Risk Level
Checking spare parts	Cramps on the legs	Surrounding the spare parts area warehouse	1. Use of PPE 2. Periodic health checks	3	2	6	MEDIUM
	Heat exhaustion	Heat generated from room temperature	1. Periodic health checks	4	2	8	MEDIUM
Office activities	Eye fatigue	Computer/laptop operation	1. Periodic health checks	4	3	12	MEDIUM
	Saturated	Doing the same activity continuously		3	2	6	MEDIUM
	Carpal tunnel syndrome	Frequent typing jobs		4	2	8	MEDIUM
	Workers experience changes in posture	Sitting position for too long		2	4	8	MEDIUM
Mobilization of spare parts using forklifts	Bumping into material shelves	Operator carrying forklift at high speed	1. Forklift operating procedure 2. P2H (Daily Checking) 3. Forklift transport equipment certification 4. SIO forklift operator	2	5	10	HIGH

From table 2 above, in the spare parts warehousing area there are eight (8) activities with a total risk of seventeen (17), the risk level of the Medium category is 88% and the *High* category is 12%. The following is a table of residual risk levels of risk remaining after actions and controls:

Table 3. Residual Risk Warehousing Spare Parts

Inherent Risk				Residual Risk				
Activity	Risk	Existing Control	Risk Level	Because / Risk Control Plan	Impact	L	C	Lx C	Residual Score
Uses of forklifts	Lifting failure	1. Procedure/WI (WI for motorcycle storage and maintenance, Procedure for Receipt of Non-RawMaterial Goods) 2. Use of PPE (Safety Shoes, HelmetSafety, Gloves, Safety Glasses) 3. Safety talk 4. SIO Forklift Operator 5. Lifting Equipment Certification 6. P2H 7.ProgramPreventive/Prog ram Predictive Maintenance	HIGH	1.Measurement/Reweighing of the weight of the material to be transported 2. Make sure the forklift check has been done before doing the work 3. Ensuring the condition of the forklift is in good condition	1. Ensure that the area of forklift use is safe from workers who do not have interests 2. Evaluation ofcompliance and discipline in the use of PPE	1	3	3	LOW
			HIGH			1	3	3	LOW
Use of stairs	Falling from a height	1. Educate how to go up and down the stairs ergonomically 2. Modification of the shape of the stairs 3. Safety talk	MEDIUM	Provides anti-slip on the steps	1. Make a checklist to check the stairs every week 2. Selection of stairs suitable for	1	2	2	LOW

Inherent Risk				Residual Risk				
Activity	Risk	Existing Control	Risk Level	Because / Risk Control Plan	Impact	L	C	Lx C	Residual Score
	Ergonomics related to work positions		MEDIUM	Implementation of work shifts	the work to be done 3. Ensure that the load is lifted or transported by ladder according to the capacity	1	2	2	LOW
The use of trolly	Occupational muscle fatigue	1. Periodic health checks 2. P2H 3. Safety talk	MEDIUM	Implementation of work shifts	1. Awareness of increasing the fatigue of working muscles 2. Ensure the carrying load does not exceed 20kg 3. Ensure regular monitoring of workers health	2	2	4	MEDIUM
	Bumping into materials	1. Use of PPE (Safety Shoes, Safety Helmet) 2. Safety talk	MEDIUM	Installation of anti-slip stickers on the floor	Ensure preventive/predictive maintenance programs are carried out	1	1	1	LOW
Manual handling	Hit by spare parts	1. Use of PPE (Safety Shoes, Safety Helmet) 2. Safety talk	MEDIUM	Install a guard behind a shelf or safety fence to avoid falling objects	1. Evaluation of compliance and discipline in the use of PPE 2. Evaluate complaints of musculoskeletal disorders periodically in periodic health checks	2	3	6	MEDIUM
	Clamped spare parts		MEDIUM	Provides information about the weight of the material		2	3	6	MEDIUM

Inherent Risk				Residual Risk				
Activity	Risk	Existing Control	Risk Level	Because / Risk Control Plan	Impact	L	C	Lx C	Residual Score
	Workers experience changes in posture	1. Periodic health checks 2. Safety talk	MEDIUM	Implementation of work shifts		2	2	4	MEDIUM
Preparation of Spare Parts	Workers experience changes in posture	1. Periodic health checks 2. Safety talk	MEDIUM	Implementation of work shifts	1. Evaluation of compliance and discipline in the use of PPE 2. Evaluate complaints of musculoskeletal disorders periodically in periodic health checks	1	2	2	LOW
	Hit by spare parts	1. Use of PPE (Safety Shoes, Safety Helmet) 2. Safety talk	MEDIUM	Install a guard behind a shelf or safety fence to avoid falling objects		2	1	2	LOW
Checking spare parts	Cramps on the legs	1. Use of PPE 2. Regular health checks	MEDIUM	Implementation of work shifts	Ensure health checks are carried out every month	2	1	2	LOW
	Heat exhaustion	1. Check your health regularly	MEDIUM	Addition of blower		3	2	6	MEDIUM
Office activities	Eye fatigue	1. Check your health regularly 2. There are adequate desks and chairs for activities in the *office*	MEDIUM	Use of monitors with anti-blue light filters	1. Ensure workers apply the 2020-20 principle (20 minutes to rest for 20 seconds and look at distant objects that are 20 feet (6 meters)) 2. Ensuring workers rotate movements to avoid the same body position for too long	1	1	1	LOW
	Saturated		MEDIUM	Working time managementPC/Laptop usage		3	1	3	LOW
	Carpal tunnel syndrome		MEDIUM			2	1	2	LOW
	Workers experience changes in posture		MEDIUM	Use of back support belt		1	2	2	LOW

Inherent Risk				Residual Risk				
Activity	Risk	Existing Control	Risk Level	Because / Risk Control Plan	Impact	L	C	Lx C	Residual Score
Mobilization of spare parts using forklifts	Bumping into material shelves	1. Forklift operating procedure 2. P2H (Daily Checking) 3. Forklift lifting equipment certification 4. SIO Operator Forklift	HIGH	1. Ensure that when the forklift operator is operating, there are no workers around the forklift 2. Provide a dedicated lane for forklifts to operate	1. Providing awareness when moving materials using forklifts 2.Socialization about the use of forklifts	1	4	4	MEDIUM

Based on table 3 above, there are *residual* risks or residual risks at several risk levels in the *High* category having *a residual risk* to *Low* at the risk of lifting failure, then to the risk of hitting a material shelf, from *the High* category to Medium. Meanwhile, the risk level in the Medium category has a *residual risk* of Medium and drops to *Low*.

Conclusion

Based on the results of the research that has been carried out, it can be concluded that:

1. There are seventeen (17 risks), with a risk level of 88% in the medium category and a high category of 12% in activities related to the use of forklift lifting equipment.
2. After being given control and control measures, the risk level of the high category in residual risk becomes low and medium. Meanwhile, the risk level in the medium category, in residual risk, becomes low and remains at medium

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