



HAZARD IDENTIFICATION AND RISK ASSESSMENT IN JEWEL MANUFACTURING INDUSTRY

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Abstract:

Hazard Identification and Risk Assessment (HIRA) is a safety tool used in most jewel manufacturing industries to identify the hazards and assess the risks in the plant. The primary purpose of the HIRA tool is to assess the risks and prioritize the risks to eliminate the hazards in the prioritized order. The assessment of the hazards in the workplace is an important task to evaluate and find out the causes of the accidents. The risk level has been calculated for all hazards in various departments on jewel manufacturing industries by multiplying the values of severity and probability. The identified hazards majorly categorized under physical, chemical, ergonomic hazard, manual handling, health, heat, and electrical hazards. The risk ratings were assigned depending upon the severity of risk occurrence low, medium, and high. This will also lead to finding out the solution for the hazards and to create a safe working place for the employees. This project work overviews the hazards in the workplace, their assessment, and recommendations to reduce the hazards in the workplace.

Keywords— Hazard Identification, Risk, Accident, Safety.

I. Introduction:

Jewel manufacturing industry is experiencing the change stage. The long Prospect for the future Standpoint stays positive for solid fundamentals reasons, for example, high GDP development, sufficient financing accessibility, higher per Capita GDP, diminishing Unemployment and rising customer desires. Currently, India is the fastest growing industry in the world. India is also leading in jewel exports and increasing in exporting jewel for the future India a huge in the sale of diamond setting. Indian jewellery is unique in its design and workmanship. India and jewellery, Indian women – terms are linked inherently. The art of making beautiful ornaments, with delicacy and acumen, has been developed throughout historical times. Jewellery is made for almost all the parts of the body, and it is, and it is also designed to match with the attire. To make jewellery more attractive, it is topped by diamonds and various types of gems. Indian jewellery inspires passion unlike any other object of desire. Every woman in India loves to wear at least a small piece of gold jewellery either in the form of glittering neckwear ornament, or dangling earrings or exquisitely crafted bangles. Even men wear simple gold ornaments like rings, bracelets and chains. Thus, we can say that everyone has been moved by the beauty of gold jewellery and it has become a part of our culture and tradition Rich history and cultural heritage of gems and jewellery together with an enduring attraction towards gold have contributed to the growth of jewellery industry.

Related Work:

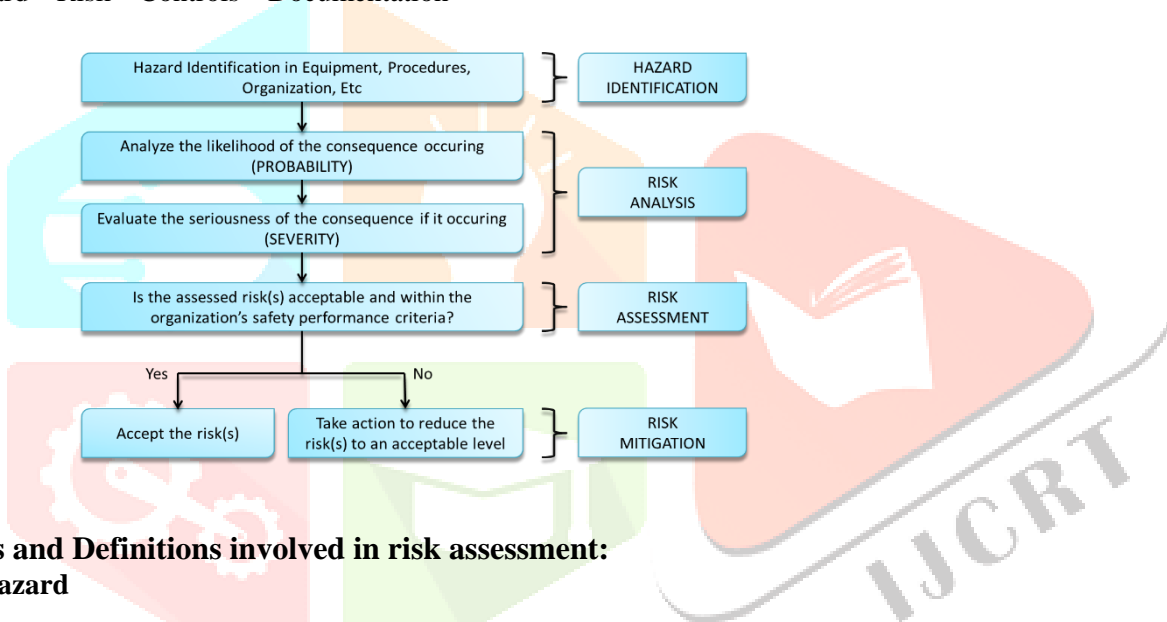
Andrea H. Okumetal:

Andrea H. Okum et al, (2016) conducted a study on foundational workplace safety and health competencies for the emerging workforce among young workers. To reduce the workplace accidents the National Institute for Occupational Safety and Health developed 8 core competencies to prepare young workers to be cognizant of workplace risks and control. From the study the authors conclude that these competencies play a critical role in preparing youth to enter the workforce as they serve as the basis for subsequent workplace safety and health learning.

II. Problem and Module Description:

Hazard Identification and Risk Assessment (HIRA) is a process that consists of a few sequential steps such as hazard identification, consequence & frequency assessment, risk estimation based on the existing controls and recommendations to reduce those risks which are not under acceptable limits. Hazard Identification and risk assessment vary greatly across industries, ranging from simple assessment to complex quantitative analyses with extensive documentation. To be effective, the organization’s procedures for hazard identification and risk assessment should take account of the following:

- Hazard • Risk • Controls • Documentation



Terms and Definitions involved in risk assessment:

Hazard

A hazard is a potential source of harm. Substances, events, or circumstances can constitute hazards when their nature would allow them, even just theoretically, to cause damage to health, life, property, or any other interest of value.

Hazard Identification

Process of recognizing that hazard exist and defining its characteristics

Risk

Combination of the likelihood of an occurrence of a hazardous event or exposure and the severity of injury or ill health that can be used by the event or exposure.

Risk Assessment

Process of evaluating the risk arising from a hazard, considering the adequacy of any existing controls, and deciding whether the risk is acceptable.

Base Risk

Risk that has been present basically without applying any control measures.

Acceptable Risk

Risk that has been reduced to a level that can be tolerated by the organization having regard to its legal obligations and its own EHS policy.

Unsafe act

Unsafe act can be defined as any activity by workers which are not as per the prescribed safety standard or practice and which can cause or likely to cause accident or risk for self or others at workplace, damage equipment and bring losses in terms of reputations and revenue to employer.

Example:

- Disregarding posted warning signs
- Failure to wear Personal Protective Equipment
- Smoking near flammables or Explosives
- Working too close to power lines
- Handling chemicals or other hazardous materials improperly
- Putting your body or any part of it onto or into shafts or openings

Unsafe condition

Unsafe conditions are hazards that have the potential to cause injury or death to an employee.

Example:

- Bad lighting
- Dangerous stairways
- Large obstacles left in the path of workers
- Blocking exits
- Trailing extension cords
- Malfunctioning equipment or tool

Near Miss

An unplanned event that did not result in injury, illness or damage but had the potential to do so. both unsafe act and conditions will lead to near misses.

III. Hazard Identification and Risk Assessment:**Area Classification**

Areas inside and outside the industry were classified into 4 departments and 25 sub-departments

Risk Estimation

The risk level is estimated by the multiplication of severity and Probability of occurrence.

$$\text{Score} = \text{Severity} \times \text{Probability of occurrence}$$

The Base risk is calculated based on the rating of severity and likelihood before considering the existing controls. The acceptable risk is calculated after considering the existing controls. The significant risks are determined by the score of acceptable risk after applying the control measures.

Classification Of Risks

After the risk assessment the hazards and risks are classified based on their risk level as low, medium, and high. This is assigned based on the multiplication of the severity and probability of occurrence. If the score is

1 - 4 it is Low,

4 - 8 is Medium and

8 and above is high.

Significant Risk

For each Hazard identified, need to determine the risk level and action plan is required for,

1. Risk level =>8
2. With severity 4, severity 3 and existing control = 0
3. Legal applicable
4. Emergency

IV. Result and Expected Outcomes:

Acceptable risk

Most of the risks are controlled by the successful implementation of existing control measures. So, the risks become low risk and are acceptable as per norms. Those low-risk hazards are acceptable by the company norms.

Significant hazards

Some high risks need to be controlled and control measures for these risks to be implemented to avoid accident and incident in future.

a) Fall from height

After loading the scrap materials from the scrap yard to truck the workers climb the loaded truck and standing above the truck to cover it with tarpaulin cover and tie it with nylon rope about a height 2 to 3 meters high. When there is a slip or trip occurs then the drivers will fall from that height.

b) Unintentional movement of vehicle

For unloading raw water from tanker lorry to temporary storage tanks which are placed in open pit below ground level. The ground in that area was uneven and there is no concrete floor. Wheel chocks also not used while parking the vehicle. So, there is chance of movement of vehicle downwards to the open pit.

c) Fall from truck

For loading the scrap materials from the scrap yard, the workers climb the truck and standing in the truck and standing above the load after loading half of the load (Scrap materials, waste cans and barrels) about a height 2 to 3 meters high. When there is a slip or trip occurs then the drivers will fall from that height.

d) Slip/Trip/Fall

In the main gate the incoming trucks and Lorries are checked by the securities by accessing the driver's cabin and collecting the kerosene stoves, LPG stoves and water cans. While climbing down from the vehicle holding the materials causing slip from the driver's cabin about 1 meter high.

e) Fall from truck

In the weigh bridge the incoming and outgoing trucks and Lorries are weighed in Weigh Bridge. At that time the driver's climb down from driver's cabin. After climbing down from the vehicle there is no stairs for climbing down from weigh bridge. When Slip/Trip occurs then the drivers will fall in the ground.

f) Fire & Explosion

In canteen LPG cylinders are used for cooking the food. The LPG cylinders are stored in a way that exposure to direct sunlight and heat during morning. Due to this condition the LPG cylinders can cause fire and explosion.

g) Slip/Trip/Fall

While unloading the materials from auto to engineering store there is no access stairs or ramp in that area. The engineering store floor is 2 feet above from the ground and there are no handrails for protecting from fall. While transferring materials the employees couldn't step to that height causing slip/trip/fall.

h) Fire & Explosion

In engineering workshop compressed nitrogen gas, Acetylene and Oxygen gas cylinders are used for welding. The cylinders are stored in a way that exposure to direct sunlight and heat. No lock chains were used to arrest the cylinder fall. Due to this condition the cylinders can cause fire and explosion.

i) Fall into open tank

In Effluent treatment plant (Sewage collection tank) every two hours once the level of water to be visually inspected by the operator. The depth of the tank is 10 feet, and its top is not closed. While checking the level of water there is a chance of falling into the open tank which causing drowning.

j) Fall into open tank

In Effluent treatment plant (Technological inlet) every shift the operator must collect sample. The depth of the tank is 8 feet, and its top is not closed. While collecting samples there is a chance of falling into the open tank which causing drowning.

V. Conclusion and Future Enhancement:

Jewel industries are one of the processing industries with highest accident occurrences, to minimize the risks of accidents safety risk assessment was conducted using Hazard Identification and Risk Assessment (HIRA) method. HIRA was used to identify the hazards that have highest risk level. There are only few hazards that have very high level of risk in the outer area itself i.e., fall from height, Slip/Trip/Fall, Unintentional movement of vehicles, Hit by Hydraulic pallet trucks, Fire & Explosion and Fall into open tanks. It is inferred that the risk levels involved in other activities are moderate owing to the stringent existing control measures. This look at has been performed in diverse hazards below physical, chemical, ergonomic chance, guide managing, health and electric dangers have been diagnosed and managed by means of the hierarchy of removal, substitution, engineering controls, administrative controls, and PPE. Hazards in each activity were identified & the risk level has been assigned. Different existing control measures and additional control measures have been suggested for each activity.

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