

Investigation the effective of the Hazard Identification, Risk Assessment and Determining Control (HIRADC) in manufacturing process

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Abstract— Hazard Identification, Risk Assessment and Determining Control (HIRADC) is part of the standard OHSAS 18001:2007 clause 4.3.1, which is the organization shall establish implement and maintain a procedure for ongoing hazard identification, risk assessment and determination of necessary controls. This was a HIRADC report for a specific operation process at Solar Company that was obtained by conducting the risk assessment together with the fellow subordinates. Based on hazard identification analysis on operation area, it was revealed 10 potential hazards which are the physical hazard, radiation and chemical hazard. Found out the total risk level score without control was at medium level for all the activities except on hazard no 9 which on lower level. After the risk assessment taken place and all the necessary control measure were carried out all the activities have fallen into low risk level category which are at level 1 and 2.

Keywords— HIRADC, OHSAS 18001:2007, risk assessment, physical hazard, radiation and chemical hazard

I. INTRODUCTION

In present practitioner, Hazard identification, risk assessment and determining control are one of the key elements of the work safe plan. The work safe plan is an important tool to audit Occupational Safety and Health (OSH) performance. Assessment and rating process is being done to examine the adequacy of the work place safety systems to manage safety and it is a framework for good management practice.

To comply with the Occupation Safety and Health Act where the employer needs to provide a safe work place, it is very crucial to prepare a Hazards report. Hazards exist everywhere and it is important to identify it and conduct necessary measurement for the probability of the hazard that it can cause harm and also to assess its severity or how serious after someone has get harm from the hazard.

The hazard identification at workplace have to do in a systematic way to ensure all hazards can be notified without fail, conducting risk assessment on the hazards, to also come out with a safe work procedure to reduce the risk of the hazards. The final part after having all of these it is important to implement and monitoring of the such agreed work safe plan or system that have been set up and also looking for further improvement of work safe practices.

Briefly, HIRADC comprises the procedure of Strategic Planning, Hazard Identification, Risk Assessment, Prepare risk control action and periodically review. Under “Strategic Planning” the management in the company establishes risk assessment team which includes workforce representatives and competent personnel within the organization. Periodically, all relevant essential HIRADC documents will be collected, and planned according to agreed methodology. During any assessment, action plan are prepared and collated for each evaluated and defined risk.

This report will analyze all the potential hazards that appear at process which is one of the Solar major process operations. This study is very significant to identify the control measure to ensure Solar work places are safe and able generate maximum productivity without any extremely risk to be encountered.

This paper aims to determining the probability level of the identified hazardous event, severity of the consequences of the hazard event, and finally to determine the risk level of an event determining the significance or value of the identified hazards and risks to the worker. In general there are five steps which are Identify the hazards, Decide who might be harmed and how, Evaluate the risks and decide on precautions, Record findings and implement them and Review assessment and update if necessary.

II. FRAMEWORK OF THE RESEARCH

The project methodology is a strictly defined combination of logically related practices; methods and process that determine how best to plan, develop, control and deliver a project throughout the continuous implementation process until successful completion and termination. It is a scientifically-proven, systematic and disciplined approach to project design, execution and completion. For any significant OSH hazard, related department/unit head shall considered for the setting programs to develop and implement necessary operational controls to reduce and overcome the risks. Each of intolerable risk shall have the recommended additional control with the hierarchy in Figure 1.

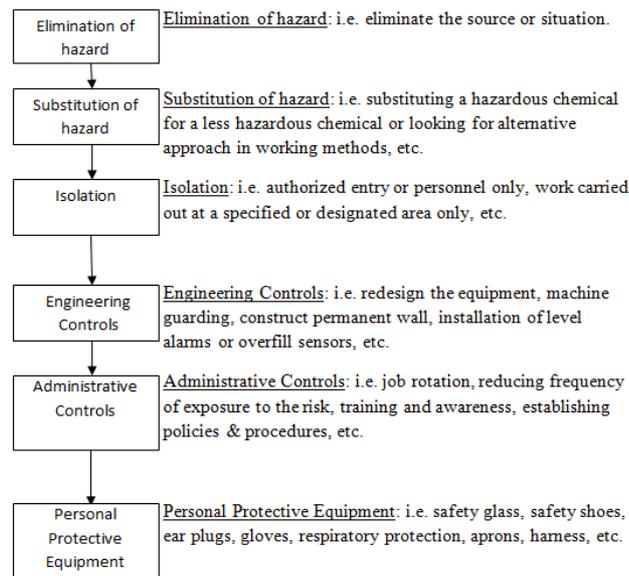


Figure 1: Methodology framework

III. CASE STUDY AND DATA ANALYSIS

A risk assessment is an important step in protecting workers and business, as well as complying with the law. It helps to focus on the risks that really matter in any workplace – the ones with the potential to cause real harm. In many instances, straightforward measures can readily control risks, for example ensuring spillages are cleaned up promptly so people do not slip, or cupboard drawers are kept closed to ensure people do not trip. For most, that means simple, cheap and effective measures to ensure our most valuable asset – our workforce – is protected. The law does not expect us to eliminate all risk, but we are required to protect people as far as ‘reasonably practicable’.

What is risk assessment? A risk assessment is simply a careful examination of what, in our work, could cause harm to people, so that we can weigh up whether we have taken enough precautions or should do more to prevent harm. Workers and others have a right to be protected from harm caused by a failure to take reasonable control measures. Accidents and ill health can ruin lives and affect business too if output is lost, machinery is damaged, insurance costs increase or we have to go to court. We are legally required to assess the risks in our workplace so that it has a plan to control the risks.

In many organizations, the risks are eminent and the necessary control measures are easy to relate. We probably already know whether, for example, we have employees who move heavy loads and so could harm their backs, or where people are most likely to slip or trip. If so, check, whether we have taken reasonable precautions to avoid injury. If we run a small organization and we are confident on what’s involved, we can do the assessment ourselves. We don’t have to be a health and safety expert. If we work in a larger organization, we could ask a health and safety advisor to help us. Some advices from those who are competent are essential. In all cases, we should make sure that we involve our staff or their representatives in the process. They will have useful information about how the work is done that will make our assessment of the risk more thorough and effective. But remember, we are responsible for seeing that the assessment is carried out properly.

When thinking about risk assessment, remember a hazard is anything that may cause harm, such as chemicals, electricity, working from ladders, an open drawer etc. The risk is the chance, high or low, that somebody could be harmed by these and other hazards, together with an indication of how serious the harm could be.

Step 1: Identify the hazards

First we need to work out how people could be harmed. When we work in a place every day it is easy to overlook some hazards, so here are some tips to help identify the ones that matter. Walk around the workplace and look at what could reasonably be expected to cause harm. Ask employees what they think. They may have noticed things that are not immediately obvious to others. Check manufacturers’ instructions or data sheets for chemicals and equipment as they can be very helpful in spelling out the hazards and putting them in their true perspective. Have a look back at all the accident and ill-health records – these often help to identify the less obvious hazards. Remember to think about long-term hazards to health (e.g. high levels of noise or exposure to harmful substances) as well as safety hazards.

Step 2: Decide who might be harmed and how

For each hazard we need to be clear about who might be harmed; it will help us identify the best way of managing the risk. That doesn’t mean listing everyone by name, but rather identifying groups of people (e.g. ‘people working in the storeroom’ or ‘passers-by’). In each case, identify how they might be harmed, i.e. what type of injury or ill health might occur. For example, ‘shelf stackers may suffer back injury from repeated lifting of boxes’.

Some workers have particular requirements, e.g. new and young workers, new or expectant mothers and people with disabilities may be at particular risk. Extra thought will be needed for some hazards. Cleaners, visitors, contractors, maintenance workers etc, who may not be in the workplace all the time. Members of the public, if they could be hurt by our activities. If we share our workplace, we will need to think about how our work affects others present, as well as how their work affects our staff – talk to them. Ask our staff if they can think of anyone we may have missed.

Step 3: Evaluate the risks and decide on precautions

Having spotted the hazards, we then have to decide what to do about them. The law requires us to do everything ‘reasonably practicable’ to protect people from harm. We can work this out for ourselves, but the easiest way is to compare what we are doing with good practice. In asking ourselves this, consider. Can we get rid of the hazard altogether? If not, how can we control the risks so that harm is unlikely? When controlling risks, apply the principles below, if possible in the following order. Try a less risky option (e.g. switch to using a less hazardous chemical). Prevent access to the hazard (e.g. by guarding). Organize work to reduce exposure to the hazard (e.g. put barriers between pedestrians and traffic).

Issue personal protective equipment (e.g. clothing, footwear, goggles etc). Provide welfare facilities (e.g. first aid and washing facilities for removal of contamination). Improving health and safety need not cost a lot. For instance, placing a mirror on a dangerous blind corner to help prevent vehicle accidents is a low-cost precaution considering the risks. Failure to take simple precautions can cost us a lot more if an accident does happen. Involve staff, so that we can be sure that what we propose to do will work in practice and won’t introduce any new hazards.

Step 4: Record your findings and implement them

Putting the results of our risk assessment into practice will make a difference when looking after people and our business. Writing down the results of our risk assessment, and sharing them with other staff, encourages us to do this. If we have fewer than five employees we do not have to write anything down, though it is useful so that we can review it at a later date if, for example, something changes. When writing down our results, keep it simple, for example ‘Tripping over rubbish: bins provided, staff instructed, weekly housekeeping checks’, or ‘Fume from welding: local exhaust ventilation used and regularly checked. We do not expect a risk assessment to be perfect, but it must be suitable and sufficient. We need to be able to show that a proper check was made. Asked who might be affected. Dealt with all the significant hazards, taking into account the number of people who could be involved. The precautions are reasonable, and the remaining risk is low. Involved staff or their representatives in the process.

A good plan of action often includes a mixture of different things such as A few cheap or easy improvements that can be done quickly, perhaps as a temporary solution until more reliable controls are in place. Long-term solutions to those risks most likely to cause accidents or ill health. Long-term solutions to those risks with the worst potential consequences. Arrangements for training employees on the main risks that remain and how they are to be controlled. Regular checks to make sure that the control measures stay in place. Clear responsibilities – who will lead on what action, and by when. Remember, prioritize and tackle the most important things first.

Step 5: Review your risk assessment and update if necessary

Few workplaces stay the same. Sooner or later, there’ll be new equipment’s, substances and procedures that could lead to new hazards. It makes sense, therefore, to review what we are doing on an ongoing basis. Every year look at our risk assessment again. Have there been any changes? Are there any improvements that still need to make? Have workers spotted a problem? Have we learnt anything from accidents or near misses? Make sure our risk assessment stays up to date. When we are running a business it’s all too easy to forget about reviewing our risk assessment – until something has gone wrong and it’s too late.

When analyzing risks, three factors should be taken into consideration. The consequence of the potential harm, the likelihood of the harm occurring, and what has been done already to stop or control the hazard. The consequence considers the potential harm that can be caused by the hazard. How much damage is likely to occur if the hazard is not controlled? Consider what has already been done to minimize the outcome of the hazard.

The likelihood considers the chance that the hazard will actually harm someone. This includes considerations of how frequently and how long people are exposed to the hazard, as well as the chance of something actually going wrong. The likelihood level should also take into consideration of what has already been done to minimize the likelihood of the harm actually occurring. Likelihood of the harm actually occurring. Minimizing the likelihood of the harm can be done by putting in the necessary control that in a manner that the hazards does not pose a risk to a worker who have to be exposed to the hazards in a work area or while working near the hazards (e.g. working on an equipment etc). Hazards should be controlled at their source (where the problem is created). The closer a control to the source of the hazards is the better. This can be achieved by elimination of the hazards, substitute with a lesser hazards or isolate the hazards or engineering control. If this does not work, hazards can often be controlled along the path to the worker, between the source and the worker. This method can be referring to as applying administrative control. If this is not possible, hazards must be controlled at the level of the worker through the use of personal protective equipment, although this is the least desirable control but for certain activity especially during preventive maintenance or direct material or chemical handling for certain activity etc. PPE are the option to be used to protect worker from the hazard.

The selection of controls will determine to what extent a hazard will be affecting a workplace and employees in the future. The preferred order in which hazards should be controlled is termed the hierarchy of controls. Controls should be selected from as high up the hierarchy table as is reasonably practical to maximize effectiveness. In some circumstances a combination of controls will be necessary to reduce the level of risk.

IV. METHOD TO AVOID RECCURANCE ACCIDENT

The following hierarchy should be used when considering control measures:

A. Most Effective – Elimination

Removing hazard or hazardous work practices from the workplace. This is the most effective control measure.

B. Fairly Effective – Substituting, Isolation and Engineering Control

Substituting or replacing hazard or hazardous work practices with a less hazardous one. Isolation or separating hazard or hazardous work practices from people not involved in the work or the general work areas. This can be done by marking off hazardous area, installing screen or barriers. Engineering Control is being used if hazard cannot be eliminated, substituted or isolated; an engineering control is the next preferred measure. This may include modifications of tools or equipment, providing guarding to machinery or equipment etc.

C. Least Effective – Administrative Control and Personal Protective Equipment (PPE)

Administrative Control is a process includes introducing work practices that reduce risk. This could include the amount of time a person exposed to a particular hazard and Personal Protective Equipment should be considered only when other control measures are not practicable or to increase protection.

Recommendations of Control Measures attached are the controls measures have been identified from the Hazard Identification and Risk Assessment report. Control Measures for Risk Score more than 5 and need to be taken immediate actions are as Figure 2.

Likelihood	Consequences				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
A / 5 (almost certain)	M / 5	M / 10	H / 15	E / 20	E / 25
B / 4 (likely)	L / 4	M / 8	M / 12	H / 16	E / 20
C / 3 (possible)	L / 3	M / 6	M / 9	M / 12	H / 15
D / 2 (Unlikely)	L / 2	L / 4	M / 6	M / 8	M / 10
E / 1 (Rare)	L / 1	L / 2	L / 3	L / 4	M / 5

RISK RATING TABLE CATEGORY

L	LOW RISK
M	MODERATE RISK
H	HIGH RISK
E	EXTREME RISK

Figure 2: Hazard No 1, 2, 3 and 4- Cuts from broken glass and back injury

Type the monitoring program to review the effectiveness of the control measures is an important element for hazards control management. The self- regulations practice such as inspections and audit are being implemented to monitor all activities at the above said areas to achieve zero accident. The programs that in place are as follows;

1. Conduct Internal Audit Safety & Health related issues. This audit is conducted by a group of trained auditors and all non-conformances against the HIRA list will be taken action.
2. The Safety and Health Committee will also look and make recommendation for improvement for any installations or practices that they feel not safe for employees to work with.
3. The OSH Surveillance Committee members will be going round for Surveillance Audit.
4. The external auditor especially from SIRIM that from OHSAS 18001 will come twice a year for auditing.

Random checks, safety audits and inspections, and the analysis of any reported accident for case which might trigger a review of procedures constitute necessary monitoring to ensure the control system is fully up to date. The introduction of any change in the workplace may have maintenance implications and should therefore be included in the monitoring process.

V. CONCLUSIONS

As a conclusion, the objective or bottom line with this hazard report is to achieve the company goal that is achieved “Zero Accident” or “Zero Lost of the Time Injury Accident”. With having this Safe System of Work, will prevent accident from happening where the accident prevention is indeed a cost-effective matter.



Government need to enforce the law of Safety and Health to make sure all the industries follow the guidelines of safe work culture. Time by time, government also need to carry out some campaigns or workshops to increase people awareness on safe work culture and the necessary to follow the rules and regulations. Employees need to stay alert and aware at all times to avoid accidents, while managers need to know the most common causes for workplace accidents and be able to spot the risk factors early for prevention.

REFERENCES

- [1] Ramesh Kumar., et al. (2012). "An Analysis on Safety Work Culture in Malaysian Manufacturing Industry." BIOINFO Business Management, ISSN: 2249-1791 & E-ISSN: 2249-1805, Volume 2, Issue 1, 2012, pp.-11-15..
- [2] Heidel D.S. (2008) "Journal of Safety Research", pg. 183-186..
- [3] Paivi Hamalainen K.L. (2009) "Journal of Safety Research," pg. 125-139
- [4] Wiegmann D, Zhang H, von Thaden T, Sharma G, Mitchell A. (2002) "A synthesis of safety culture and safety climate research." Technical Report ARL-0203/FAA-02-2.
- [5] Reason, J. (1998), 'Achieving a safe culture: theory and practice', Work & Stress, vol. 12, no. 3, pp.293-306
- [6] Factories and Machinery Act with Regulations. ACT 139
- [7] IOM (Institute of Medicine). 1999." *To Err is Human: Building a Safer Health System.*" Washington, DC: The National Academies Press.
- [8] James F. Whitting 2004. *The Missing Elements of OSHMS and Safety Programmes - Calculating and Evaluating Risk*, Journal of Occupational Safety and Health. Jan 2004 Vol. 1 No.1
- [9] Mohamad Khan Jamal Khan, Nor Azimah Chew Abdullah (2005), *Keselamatan dan Kesehatan Pekerja Dalam Organisasi, Petaling Jaya*. Prentice Hall Pearson