Study of Safety for manufacturing Water wall Panel by Using Job Safety Analysis tool

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Abstract- To study the Safety and Hazards in Manufacturing One of Boiler Components of Water Wall Panel by Using Job Safety Analysis in the Public sector of Boiler Manufacturing Industry in India. After the Analysis the Hazards they is set of Safety Precautions to overcome the Hazards and To be Safe practices in workplace and in India.

Index terms- Boiler Component, Water Wall Panel, Job Safety Analysis Safety

I. INTRODUCTION

The Company which I did is the India best Manufacture of Boiler And Its components and supply to All over the world. A job safety analysis (JSA) is a procedure which helps integrate accepted safety and health principles and practices into a particular task or job operation. In a JSA, each basic step of the job is to identify potential hazards and to recommend the safest way to do the job. Other terms used to describe this procedure are job hazard analysis (JHA).

II. JOB SAFETY ANALYSIS

In modern production planning and control, job safety analysis is an essential part. It involves determination and specification in detail of each job in terms of methods, sequence, material and tools required. Job safety analysis is a procedure of analysing jobs for the specific purpose of finding the hazards in each step in the job and developing the safety precautions to be adopted. This should be done at the stage of planning of production. The technique, however, can be applied at any stage and in fact, it is one of the most important means of discovering hazards in the various jobs of an existing process where the safety aspects might not have been fully taken care of in the lay out of the plant or the design of the equipment, machinery, process or the method of working. It is essential that maintenance jobs and also other repetitive jobs having accident potentials are analysed for hazards and adequate safety measures laid down.

III. STEPS TO CARRIED OUT JSA

1. Select the job.
2. Divide the job into successive steps.
3. Identify hazards at each step.
4. Develop ways to eliminate the hazards and prevent the accident potentials.

IV. IMPLEMENTATION OF JOB SAFETY ANALYSIS

1. Job safety analysis should be distributed to all employees.
2. The employees should be observed whether they are following or not.
3. Job safety analysis should be reviewed after every accident and revised if necessary.
4. Changes any made, should be brought to the notice of the employees.

VI. BOILER COMPONENT

-Water Wall Panel
Water Wall Panels are used in modern day Boilers in place of Steam Generating Tubes to reduce heat loss due to their gas tight nature and reduce insulation costs. We fabricate Water Wall Panels using automatic Fin to tubes welding machines and large Tube Panel Benders to achieve desired shape of panels which can have Swaged Ends, Stub Welded to
Headers. We supply Panels with integrated manhole openings in the panels.

V. ADVANTAGES

1. It is simple means of discovering the potential hazards in each step of a job.
2. The supervisor doing the analysis and the employees with whom they discuss, get closely acquainted with hazards in the job.
3. It helps to train employees, both old and new, in safe procedures of work.
4. It is a good aid in making planned and effective safety inspection.
5. It indirectly results in improvement in job methods.
6. It is an excellent opportunity to question present job method to increase safety, reduce cost and improve productivity.

<table>
<thead>
<tr>
<th>Department: Production Bay 1/Bldg 30</th>
<th>Analysis By: Nagendra Kumar PG Student (Industrial Safety Engineering) Bannari Amman Institute of Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job Title: Loading, Roto blast and Butt welding process</td>
<td>Reviewed By: Karuppas Deputry Manager, Safety management</td>
</tr>
<tr>
<td>Supervisor: K.P. Patnaik</td>
<td>Approved By:</td>
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**Required Personal Protective Equipment (PPEs):**
- Safety shoes, Leather gloves, Goggles, Safety helmet
- Airline respirator, PVC gloves, Non-slip chemical resistant sole shoe, Body suit

<table>
<thead>
<tr>
<th>s.no</th>
<th>Operation</th>
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<tbody>
<tr>
<td>2.</td>
<td>Moved to roto blast to remove the rust</td>
<td>1. High Noise producing during Roto blast operation 2. High machine Vibration which will affect Human</td>
<td>1. Advise workers to wear Ear Muff during roto blast operation. 2. They should be proper Machine Vibration amester.</td>
</tr>
<tr>
<td>3.</td>
<td>End cutting and edge preparation for butt welding</td>
<td>1. High noise producing during End cutting and Edge Preparation 2. While doing Butt Welding it emitting high UV Rays 3. Setting up the job the workers feel back pain due to bad postures</td>
<td>1. Advise workers to wear Ear Muff During End cutting and Edge Preparation. 2. Advise workers to wear welding googles with respected shade Filters. 3. Give awareness and training for workers how to handle job and good postures Techniques.</td>
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</table>
### Process of Water Wall Panel

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</table>
| 1.   | Butt welding to achieve required length | 1. While doing Welding they is high heat Which the Worker feel Uncomfortable To do Welding Operation.  
2. High Noise due to Butt Welding Operation  
3. High fumes producing while doing welding operation its affects Breathing Problem for Welder. | 1. They should be Proper Ventilation and Arrangements of Local Exhaust Ventilation.  
2. Advise the Worker to Wear Ear Muff To Prevent Hearing Aiding Problem.  
3. Advise The Workers to Wear Respiratory Protective Mask To avoid Inhale of Fumes. |
| 2.   | Radiographic test for the joints | 1. High Radiation of X-rays are Emitting From Radiography Inspection Machine | 1. Advise Workers To wear Kevlar Apron or Lead Apron To Protect the workers from x-rays  
2. Make a warnings boards and signages for to avoid unauthorized entry |
| 3.   | Panel formation in Panel Processing Machine | 1. Nearby the Machine they are Oil and Water Spillages on the floor Which has high chances of Slip Hazards .  
2. High heat Producing Area Which the Workers are Feel discomfort able | 1. Regular Housekeeping is needed.  
2. Arrangements of Adequate Ventilation |
| 4.   | Formed Panel moved to panel fit up area | 1. Poor Movement of Worker while Doing Repetitive Action because of Constrain Space  
2. Lifting Arrangement By Chain Slings are in Safe Position to Lift which will be damage the Panel Pipes | 1. Proper Arrangement of Workplace And Worker movement without any constrain  
2. Proper arrangement And Lifting Techniques without Damaging The panel Pipe |
| 5.   | Rework welding and grinding | 1. During Welding They is high heat producing in The welding spot Area.  
2. They is poor Ventilation Arrangement and workers feel discomfort able  
3. The Ground is full of welding spatters and oil Grease which has high chance of Slip Hazards.  
4. During welding Operation They are More fumes which the workers feel Uncomfortable And it will be Causes Breathing Problems.  
5. During Welding Operation The workers seating position are not Correct and workers feeling discomfort. | 1. They should Be Proper Arrangement of Local Exhaust Ventilation and good Air Circulation In workplace.  
2. In that process area they ground should be clean and Dust free zone by proper and regular Housekeeping.  
3. Advise the workers to wear Respiratory mask as per result of Air sampling test Report and level of air Contamination.  
4. Train the welding workers about the Good Postures for Welding Operation. |
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| 1    | Opening marking and cutting      | 1. During Cutting Operation They is high heat producing in the welding spot Area.  
2. They is poor Ventilation Arrangement and workers feel discomfort able  
3. The Ground is full of Cutting Chips which has high chance of Cutting Injury.  
4. During cutting Operation They are More Flying objects (Chips) which the workers cause Face injury.  
5. During Cutting Operation The workers seating position are not Correct and workers feeling discomfort. | 1. They should be Proper Arrangement of Local Exhaust Ventilation and good Air Circulation In workplace.  
2. In that process area they ground should be clean and Dust free zone by proper and regular Housekeeping  
3. Train the welding workers about the Good Postures for Cutting Operation.  
4. Advise the workers to wear Face shield to Avoid Face injury. |
| 2    | Opening fit up and manual TIG welding | 1. During Welding They is high heat producing in the welding spot Area.  
2. They is poor Ventilation Arrangement and workers feel discomfort able  
3. The Ground is full of welding spatters and oil/Grease which has high chance of Slip Hazards.  
4. During welding Operation They are More times which the workers feel Uncomfortable And it will be Causing Breathing Problems.  
5. During Welding Operation The workers seating position are not Correct and workers feeling discomfort. | 1. They should be Proper Arrangement of Local Exhaust Ventilation and good Air Circulation In workplace.  
2. In that process area they ground should be clean and Dust free zone by proper and regular Housekeeping  
3. Advise the workers to wear Respiratory mask as per result of Air sampling test Report and level of air Contamination.  
4. Train the welding workers about the Good Postures for Welding Operation. |
| 3    | Opening finning and welding      | 1. During Welding They is high heat producing in the welding spot Area.  
2. High Noise producing during Welding operation.  
3. High machine Vibration which will affect Human.  
4. During Welding Operation, the workers seating position are not Correct and workers feeling discomfort. | 1. They should be Proper Arrangement of Local Exhaust Ventilation and good Air Circulation In workplace.  
2. Arrange good Machine Design and Built in design with well acoustic system  
3. Advise workers to wear Ear muffs.  
4. Train the welding workers about the Good Postures for Welding Operation. |
### Job Title: Finishing process

#### Reviewed By: Karuv Gopan

**Deputy Manager, Safety management**

**Supervisor:** K.P. Patnaik

**Approved By:**

#### Required Personal Protective Equipment's (PPEs):
- Safety shoes, Leather gloves, Goggles, Safety helmet
- Airline respirator, PVC gloves, Non-slip chemical resistant sole shoe, Body suit

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<td>1.</td>
<td>Attachment fit up and welding</td>
<td>1. During Attachment fit up and Welding process They is high heat producing in the welding spot area. 2. They is poor Ventilation Arrangement and workers feel discomfort able. 3. During welding Operation They are More fumes which the workers feel Uncomfortable And it will be Causing Breathing Problems.</td>
<td>1. They should Be Proper Arrangement of Local Exhaust Ventilation and good Air Circulation In workplace. 2. Advice the workers to wear Respiratory mask as per result of Air sampling test Report and level of air Contamination.</td>
</tr>
<tr>
<td>2.</td>
<td>Cold side welding and grinding clearance</td>
<td>1. High Noise producing During Cold side welding operation 2. High machine Vibration which will affect Human 3. During welding Operation They are More fumes which the workers feel Uncomfortable And it will be Causing Breathing Problems.</td>
<td>1. Advice workers to wear Ear Muff during Heavy welding Operation. 2. They should be using Less Vibration Equipment. 3. Arrangement of proper Local Exhaust Ventilation (LEV). 4. Advice to workers to wear proper Respiratory Mask.</td>
</tr>
<tr>
<td>3.</td>
<td>Hot side welding and grinding clearance</td>
<td>1. During Welding They is high heat producing in the welding spot area. 2. During welding Operation They are More fumes which the workers feel Uncomfortable And it will be Causing Breathing Problems.</td>
<td>1. Arrangement of proper Local Exhaust Ventilation (LEV) and good workplace temperature. 2. Advice to workers to wear proper Respiratory Mask.</td>
</tr>
</tbody>
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#### Department: Production

**Bay 1/Bldg 50**

#### Analysis By: Nagendra Kumar V, PG Student (Industrial Safety Engineering) Bannari Amman Institute of Technology

### Job Title: Both end chamfering and ID plugging

**End cutting, Split, Slot marking and cutting**

**Edge bar marking and cutting**

**Reviewed By: Karuv Gopan**

**Deputy Manager, Safety management**

**Supervisor:** K.P. Patnaik

**Approved By:**

#### Required Personal Protective Equipment's (PPEs):
- Safety shoes, Leather gloves, Goggles, Safety helmet
- Airline respirator, PVC gloves, Non-slip chemical resistant sole shoe, Body suit

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<tr>
<td>1.</td>
<td>Edge bar marking and cutting</td>
<td>1. High Noise producing During Cold side welding operation 2. High machine Vibration which will affect Human 3. During welding Operation They are More fumes which the workers feel Uncomfortable And it will be Causing Breathing Problems.</td>
<td>1. Arrangement of proper Local Exhaust Ventilation (LEV) and good workplace temperature. 2. Advice to workers to wear proper Respiratory Mask. 3. They should be using Less Vibration Equipment. 4. Advice to workers to wear proper Respiratory Mask.</td>
</tr>
<tr>
<td>2.</td>
<td>Both end chamfering and ID plugging End cutting, Split</td>
<td>1. High noise producing during cold side welding operation 2. High machine vibration which will affect human 3. During welding operation they are more fumes which the workers feel uncomfortable and it will be causing breathing problems. 4. The ground is full of welding spatters and oil/grease which has high chance of slip hazards.</td>
<td>1. Arrangement of proper Local Exhaust Ventilation (LEV) and good workplace temperature. 2. Advice to workers to wear proper Respiratory Mask. 3. They should be using Less Vibration Equipment. 4. Advice to workers to wear proper Respiratory Mask.</td>
</tr>
<tr>
<td>3.</td>
<td>End cutting, Split, Slot marking and cutting</td>
<td>1. During Cutting Operation They is high heat producing in the welding spot area. 2. They is poor Ventilation Arrangement and workers feel discomfort. 3. During cutting Operation They are More Flying objects (Chips) which the workers cause Face Injury. 4. During Cutting Operation The workers seating position are not Correct and workers feeling discomfort able.</td>
<td>1. Arrangement of proper Local Exhaust Ventilation (LEV) and good workplace temperature. 2. Train the welding workers about the Good Postures for Cutting Operation. 3. Advise the workers to wear Face shield to Avoid Face injury. 4. Use adjustable guards in Cutting equipment.</td>
</tr>
</tbody>
</table>
VII. HAZARDS FOUND OUT IN THE WATER WALL PANEL MANUFACTURING

1. More Noise
2. Poor Manual Handling
3. Poor Housekeeping
4. Poor Ventilation
5. Improper Machine Equipment
6. Poor machine built in design
7. Poor knowledge of PPE
8. Lack Of Training

VII. SAFETY PRECAUTIONS

1. Give proper Training and awareness about the Hazards in the workplace.
2. Maintain the Hazards measure and report the Documents.
3. Use the Machine with Built in safe with good Vibration Arrestor and less noise.
4. During the Roto Blast operation, cutting, welding and Edge Preparation operation they are high noise producing, at the workplace advice the workers to wear Ear Muff and around the work Area put Warning Boards and signages of precaution symbol poster to protect the workers from hearing Aid Problem.
5. Arrange the Local Exhaust Ventilation in the Workplace to Reduce the dust accumulation and to have good air Circulation.
6. Regular monitor of air dust in the workplace must.
7. Make the workplace Temperature at safe temperature which makes the workers to be Comfort.
8. Arrange the Lightning by natural or artificial or even both with no shadows, over-lightning and low lightning.

IX. CONCLUSION

Thus We done the Job Safety analysis For boiler Component Water Wall Panel and identify various hazards by each by each step manufacturing the water wall panel component from stores to shipping in between various machining operations. We gave Safety Precautions to overcome the Hazards And for to Maintain Good Practices in the workplace and All Over the world.
X. LITERATURE REVIEW

