**ACTIVITY :** **FABRICATION DISMANTLING & ERECTION**

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* Objective : - Safe work procedure for fabrication dismantling & erection
* Scope : - Blast furnace & Accessories
* Ref. : -
* Responsibility : - Engineer In Charge & workmen at job

**PPE –s to be used:**

* Helmet, Safety shoes, Dust masks, Hand gloves safety belt and goggles

Work No 1 : Fabrication of Structures

Work no 2 : Erection

Work No 3 : Dismantling of the structures

Work No 4 : Working on rolling machine

**Aspect – Impact**

|  |  |
| --- | --- |
| Scrap generation | Resource Depletion |
| Dust/Fumes generation | Air pollution |

Hazards identified

**Mechanical hazard -**

1. Trapping between two objects,
2. Fall of material, hammer, tools, slinged items, bolts, etc.
3. Fall of person from platform,
4. Entanglement
5. Impact of moving / slinged items.
6. Fall of material from height such as angles, channels, beams, plates ,bolts ,nuts etc. due to poor housekeeping.
7. Failure of sling, D shackle, chain pulley block
8. Failure of full body harness due to improper clamping, damaged rope, hooking on weak structure
9. Skidding of person due to poor housekeeping, oil spillage, uneven surfaces, broken bricks etc
10. Back pain while handling heavy load and improper posture
11. Cut injuries from sharp edges of items
12. Getting trapped / skid material stacked
13. Hitting of moving vehicles, and machinery in the plant
14. Slipping/Rolling of trolley while loading/unloading
15. Falling of cylinders due to improper fixing of protective M.S.chain
16. Fall of cylinder trolley due to failure of wheels
17. Explosion due to impact on the knob
18. Failure of the clutch / brake of hydra / material handling vehicles
19. Sliding/rolling of the material from vehicle.
20. Impact of moving / slung items, overturning / slipping of steel items.
21. Failure of rope
22. Bursting of tyre while moving / during erection
23. Jamming of the hand while locking the tempo/truck gates.
24. Getting trapped below Hydra because of failure of brakes or sudden jerks
25. Getting trapped between the swing portion & the body of Hydra
26. Getting hurt because of poor visibility
27. Impact of other vehicles
28. Non usage of PPE like shoes, helmet & safety harness, goggles
29. Alcoholism
30. Skidding of wheel stoppers
31. Human error
32. Overturning of vehicles due to uneven surfaces
33. Overturning due to loosing the centre of gravity.
34. Hitting of person while reversing
35. Incidents due to poor illumination
36. Failure of the workmen basket structure, temporary platform
37. Fall of person from height due to unbalance from workmen basket, temporary platform
38. Trapping of the person between basket and structure
39. Fall of workmen basket, temporary platforms due to failure of the clamping
40. Lifting of the truck due to unstable loading
41. Hitting on surrounding structures, while negotiating a turn
42. Fall of the Pal finger crane from the truck due to failure of mounting bolt
43. Failure of hydraulic system
44. Failure of hook of the crane
45. Fall of “falka” of truck during movement.
46. Fall of the extended boom from top.
47. Damage of overhead structure during marching of crane / hydra
48. Hitting / trapping of crane due to improper / non sequential operation
49. Bending of chassis due to non levelling of stabilizers
50. Failure of stabilizers
51. Failure of crane / chassis due to non levelling of crane platform with water level
52. Hitting of the boom due to fast operation.
53. Improper operation due to improper signalling.
54. Scaffold collapse caused by instability or over loading
55. Incident due to usage of mobile while driving / operation of crane / hydra / Palfinger/ Hiab basket
56. Trapping due to Improper jacking during crane maintenance
57. Fire due to fall of sparks welding / gas cutting
58. Back fire during gas cutting
59. Failure of welding hook due to improper / inadequate welding
60. Failure of welding hook due to welding on hard faced plates / unknown plates
61. Welding light may cause irritation & watery eyes by other crew members like fitters & riggers during fitment of structures.

**Human behavior**

1. Alcoholism,
2. Casual approach
3. No usage of PPE's.

**Physical hazard**

1. Vehicle emission
2. Pressure due to failure of air /hydraulic system
3. Burns

**Electrical hazard**

1. Electric shock from overhead lines or welding
2. Short circuit due to failure of electrical system
3. Electric shock from battery terminal

**Chemical hazard** –

1. Fire & Explosion
2. Co Gas poisoning

**General Guidelines**

1. Take clearance from the concerned department if the job is related to the other department.
2. Cordon the area where job is to be carried out.

**Work No 1 : Fabrication of Structures**

1. Shift the structural material from the store following instructions given in the work procedure [WI/MAINT/12.](file:///C:\Users\00015340\AppData\Local\Temp\Temp1_2020%20Approved%20WIHIRA.zip\WI\WIMAINT12%20MATERIAL%20HANDLING%20.doc)
2. Plan cutting of material for maximum use of material in structure developed and least waste generation as scrap.
3. Carry out the cutting operation using gas-cutting set as per instruction give in SP 44.
4. Stack all the structure at proper place in safe condition so that it will not affect others.
5. Grind the sharp edges of the structure.
6. Carry out the welding operation as per design supplies in the form of drawing or as per instruction of engineer in charge.
7. Only trained operators should carryout grinding cutting and welding operation.
8. All temporary welded angles, channels, beams etc has to be removed from site before giving clearance of job.
9. Ensure proper housekeeping after completion of the job as per instruction [WI/MAINT/91](file:///C:\WINDOWS\Desktop\QEHS%20MECH%20ON%20on%20Maint212\QEHS\departmental%20manual\11%20%20Work%20instruction\WIMAINT94%20%20FAB%20DISMANTLING%20&%20ERECTION.doc)

**Work no 2 : Erection**

1. Clean the surface where the structure/equipment is to be erected.
2. Lift the material following procedure indicated in [WI/MAINT/12](file:///C:\Users\00015340\AppData\Local\Temp\Temp1_2020%20Approved%20WIHIRA.zip\WI\WIMAINT12%20MATERIAL%20HANDLING%20.doc) - Handling of materials.
3. Lock the structure, equipment at the required position.
4. Carry out other remaining welding job for permanent locking. For erection of equipment at height ensure no person stands below the lifted object.
5. Use safety belt while working at height.
6. All temporary welded angles, channels, beams etc has to be removed from site before giving clearance of job.
7. Ensure proper housekeeping after completion of the job as per instruction [WI/MAINT/91](file:///C:\WINDOWS\Desktop\QEHS%20MECH%20ON%20on%20Maint212\QEHS\departmental%20manual\11%20%20Work%20instruction\WIMAINT94%20%20FAB%20DISMANTLING%20&%20ERECTION.doc)

**Work No3 : Dismantling of the structures**

1. Lock the object with the rope or chain block if the handled material is large
2. Do the cutting or dismantling job.
3. Ensure no person stands in the area of swing of the material while cutting.
4. Follow the procedure specified as per work instruction [WI/MAINT/12.](file:///C:\Users\00015340\AppData\Local\Temp\Temp1_2020%20Approved%20WIHIRA.zip\WI\WIMAINT12%20MATERIAL%20HANDLING%20.doc)
5. Do take proper care to avoid falling of material from height when job is carried out at height.
6. All temporary welded angles, channels, beams etc has to be removed from site before giving clearance of job.
7. Ensure proper housekeeping after completion of the job as per instruction [WI/MAINT/91](file:///C:\WINDOWS\Desktop\QEHS%20MECH%20ON%20on%20Maint212\QEHS\departmental%20manual\11%20%20Work%20instruction\WIMAINT94%20%20FAB%20DISMANTLING%20&%20ERECTION.doc)

**Work No4 : Working on rolling machine**

**Procedure**:

**Rolling of plate on rolling machine:**

1. Gas cut the plate as per required size/drawing .Keep extra length for pre-punching
2. Do edge preparation by grinding / gas cutting.
3. Switch ON the Electrical isolator and also insert the key for starter.
4. Check electrical safety validity and healthiness before starting the job

**Operation of Machine:**

1. Certify the Rolling machine before operation for safety and condition
2. Trained personnel should operate the rolling machine.
3. Skilled personnel’s are to be allowed to handle the plates during the rolling operations.
4. Only one person is allowed to operate the machine.
5. For safe handling of plates, a monorail beam is required to be fitted above the rolling machine and proper handling facility with certified trolley and chain pulley block to be fitted. It is essential build the structure with the approved drawing and certified tools and tackles considering the maximum capacity being handled. The max capacity being handle should be displayed and duly certified by a competent person approved by factory Inspectorate.
6. If handing facility is not made, hydra can be used with adequate care and following guideline must be followed.
   1. The Hydra operation to be carried out as per the work instructions mentioned in **“Operation Of Hydra and Cranes ” & WI/MAINT/12 .**Procedure for using the hydra during rolling operation to be followed as mentioned below:
   2. Use Hydra to lift the plate by using proper plate hooks and slings. Edge of the plate to be manually prepared to ensure complete circle.
   3. Place the plate on the movable stand. Top of the stand will be in line with the base rollers of rolling machine. Remove the hydra.
   4. All care must be taken to avoid trapping of person while hydra is moving forward as well as reverse.

**Pre-punching of plate**

1. Switch ON the machine and carefully place the template on the fixed rollers.

Insert one end of plate to be pre-punched and tighten the adjustable roller equally on both the sides. Plate will be manually pushed in the rolling machine. Hydra will not interfere with this activity now. Once the plate completely rolls, push the table back if required so to avoid its interference with the rolling plate.

1. After required tightness, ensure the workmen are on both sides.
2. Start pre-rolling of one end of plate. Approx 100mm to 200mm. Then stop the machine and remove the starter key.
3. Hold the pre-punched plate and loosen the adjustable roller jack bolts.
4. Remove the pre-punched plate and repeat the above procedure for pre-punching other side of plate.
5. Switch OFF the machine and remove the switch key.
6. Remove the template and tighten the jack bolts.
7. When the plate is about to form a complete circle, bring back the hydra and sling it as shown in the figure below. Ensure complete circular roll.

**Rolling**

1. Start rolling of the plate by adjusting the jack bolts till both ends of the plate meets together.
2. Then put OFF the machine, remove the switch key and tack weld the two ends of the plate preferably from inside.
3. Again start rolling so that the welded joint gets rolled properly.
4. Switch OFF the machine, remove the switch key and hold the adjustable roller by locking jack bolt.
5. Remove the lock of sliding roller supports and loosen the jack bolt and slide it back and turn it on the ground.
6. Rolled piece to be removed by loosening the other side jack bolt.
7. Put back the sliding roller support and lock it.
8. Locking jack bolt to be loosened.
9. Put back the side way of the rolling machine in position and follow the procedure for the next plate rolling.
10. There should not be any interference from the other person who are not working in the same team this is required to avoid communication shortfall.
11. Gas cutting, grinding, welding activity are to be strictly carried out as per the standard Guide lines given in the work instruction of related activities.
12. Rolling operation to be carried out in the day time or with the proper illumination up to 1900 Hrs.

**DO:**

* Lock the material or tie with rope while handling any material.
* Use standard welding electrodes
* Ensure good welding quality.
* Study any usage of cut material for re usage so as the wastage will be minimum.
* Use D shackles While frequent opening/closing operation is involved for lifting
* Always hold the plate by hand and maintaining a safe distance from the rolling machines.
* Use tested chain blocks & slings only.
* Cordon the total workable area.
* Use completely sealed goggles while cleaning the machine with compressed air.
* Follow work instruction [WI/MAINT/12](file:///C:\Users\00015340\AppData\Local\Temp\Temp1_2020%20Approved%20WIHIRA.zip\WI\WIMAINT12%20MATERIAL%20HANDLING%20.doc) for material handling
* Stay away from the lifted items.
* Check the slings before lifting items.
* Use proper tools
* Use tested cutting set, slings, welding machine, jacks, D-shackle, chain pulley

**DO NOT:**

* Stand below the hanging structures.
* Weld the lifting hooks on casted material. (It must be available in design itself)
* Keep Material on slope while carrying out fabrication, erection, cutting job.
* Keep any steel items like angles , channels , beams, plates , etc on platforms at height after completion of job .
* Stand on the opposite side while rolling
* Keep materials on walkways.

**Amendement Record**

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| **Date** | **Manual Section Ref. & Para** | **Brief details of Revision** | **New Rev.** |
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| **Prepared By:**  Area Engineer | **Reviewed & Issued By:**  Management Representative | **Approved By:**  Mechanical Head |
| **Signature** | **Signature:** | **Signature:** |
| **Review Date: 12.12.22** | **Review Date: 12.12.22** | **Review Date: 12.12.22** |