1. **PURPOSE:** To define safe procedure for *Tray cylinder changing for HCM*
2. **SCOPE:** MCD – 2
3. **RESPONSIBILITY:** Mechanical in charge & Maintenance Fitter
4. **SAFETY PRECAUTIONS:**

* Ensure *Electrical & Mechanical isolation* prior to starting work on equipment. Follow documented isolation procedure as per Vedanta approved isolation standards.
* Check availability of valid DCP fire extinguishers, if not available then inform shift in charge.
* *Safety briefing / Toolbox talk* to be carried out and to be documented
* Follow *one man one lock* system and use of LOTO box
* Check and ensure safety of man and equipment before starting operations.
* Ensure proper illumination during dark hours.  In case of any issues the same should be highlighted to the Production shift in charge. Shift & keep 24V portable light in case of emergency & Torch for illumination
* All unwanted material from the area to be removed before releasing the equipment electrical isolation.
* Follow proper documented procedure for releasing the electrical isolations as per Vedanta approved isolation standards.
* *Certified lifting Tools & Tackles* to be used for the job.

1. **PPE to be used :**

* Safety Helmet
* Safety shoes
* Safety Goggles
* Hand gloves
* Dust mask

1. **Activities**

* Activity No 1 : Replacement of HCM *Tray cylinder*
* Activity No 2 : Replacement of *Rail lock mechanism*
* Activity No 3 : Replacement of *HCM hood*
* Activity No 4 : Replacement of *HCM hood(1st from oven side)*
* Activity No 5 : Replacement of *Bogie wheel.*
* Activity No 6 : Replacement of *HCM Door handler*
* Activity No 7 : Replacement of *Tray cylinder hose*
* Activity No 8 : *Preventive* Maintenance.

1. **Aspect-Impact:**

* Scrap generation Resource Depletion.
* Dust Generation Air Pollution.
* Oil Spillage Land Contamination & Resource depletion
* Used Cotton Cloth/Handgloves Land Contamination

1. **Hazards** **identified**
2. Physical Hazard

* Fall of Hot coke , flying of coke dust and fines
* Slip due to Oil
* Dripping hot water from tray
* Contact with hot structural parts of tray bottom

1. Mechanical Hazard

* Impact, Entrapment, Slip and fall

1. Chemical Hazard

* Fire and explosion, fumes.

1. Human behaviour aspect of operators:

* Alcoholism.
* Casual approach.
* Horse play.
* Non usage of PPE’s
* Improper Housekeeping
* Height Phobia

1. **PROCEDURE:**

**Activity No 1 : Replacement of HCM *Tray cylinder***

* Ensure the new tray cylinder is pressure tested & ok
* Shift the material, tools and tackles required to area of maintenance.
* HCM to be aligned at Oven no 01 or 36 for maintenance.
* Before aligning the HCM for removal of cylinder, shift the new cylinder to adjacent oven with help of F-15 crane.
* Take work permit of the activity from the respective shift in charge
* Take Electrical shutdown of HCM before start of job.
* Trained workmen are allowed to execute the job.
* Close the shut off valves of A port and B port hydraulic line of the tray cylinder.
* A cross beam to be welded inside the tray just above the tray cylinder in perpendicular axis.
* One liner above the cylinder to be removed and a certified 2T chain block needs to fixed to the welded cross beam through the removed liner.
* Now arrest the existing cylinder by 2 ton chain block
* Dismantle the cylinder & lower it on ground and the hoses removed needs to be dressed with cotton waste to arrest oil spillage.
* Clear the electrical shutdown temporarily as per procedure after removing men and tools & tackles from line of action.
* Move the car and align it above the spare cylinder & again take electrical shutdown of HCM
* Replace the Existing Cylinder with spare Cylinder and assemble it with hoses and proximity sensor.
* Cylinder fork to be connected to the tray and the shut off valves of A port and B port to be opened.
* Liner needs to be fixed back and cross beam to be gas cut.
* Housekeeping needs be done at the area of repair once the job is done.
* Shut downs to be released as per Standard procedure.
* Trials to be taken, Check for the moment of the tray, SSI readings on screen, smooth movement , proximity sensing ,Oil leakages and any other Abnormality
* Report to the production for further operations once no abnormalities are found.
* Close the work permit of the activity from the respective shift in charge and User department.

**Activity No 2 : Replacement of Rail lock mechanism**

* Shift the material, tools and tackles required to area of maintenance
* HCM to be aligned at Oven no 1 for maintenance
* Position the equipment at oven no 1 at unlocking conditionof Rail locking system.
* Take work permit of the activity from the respective shift in charge and User department.
* Take Electrical shutdown permit of HCM.
* Trained workmen are allowed to execute the job.
* Dismantle the Rail Locking cylinder from the locking system & dress the open ends of Hydraulic hoses with cotton cloth to prevent contamination.
* Dismantle the rail locking system from the structure.
* Replace with new rail locking assembly by ensuring adequate packing with Shims. Between the structure and locking system.
* Assemble the rail locking assembly with the cylinder.
* Connect the hoses and proximity sensor back to the cylinder.
* Housekeeping needs be done at the area of repair once the job is done.
* Shut downs to be released as per Standard procedure.
* Trials to be  taken, Check for the Rail locking action, Check for the piston stroke ,Check for the gap between the rail and the roller and Oil leakages
* Report to the production for further operations once no abnormalities are found.
* Close the work permit of the activity from the respective shift in charge and User department.

**Activity No 3 : Replacement of HCM hood ( Rear)**

* Shift the material, tools and tackles required to area of maintenance.
* HCM to be aligned at Oven no 1 for Replacement.
* Take work permit of the activity from the respective shift in charge and User department.
* Take electrical shutdown permit of HCM and the DSL HCC side before attending job.
* Trained workmen should execute the job.
* A crane mounted truck/crane operational with competent person is to be mounted below the angle of repose at CST South side.
* Remove the locking plates of the hood on sides
* Weld the cleats on top of hood for handling & slinging purpose
* Attach certified slings to the hood & hoist it till it moves out of the hotcoke machine
* Remove the old hood & park at a safe location
* Install the new hood in position & lock it with locking plates on either sides
* Shut downs to be released as per Standard procedure.
* Trials to be taken, Check for the Tray movement & should not foul with any door handler,Check for any odd noise.
* Report to the production for further operations once no abnormalities are found.
* Close the work permit of the activity from the respective shift in charge and User department.

**Activity No 4 : Replacement of HCM hood ( Front 1st one from Oven side)**

* This procedure is for replacement of only 1st hood from oven side without disturbing the other hoods.
* Shift the material, tools and tackles required to area of maintenance.
* HCM to be aligned with Ground Pusher for Replacement.
* Take work permit of the activity from the respective shift in charge and User department.
* Take electrical shutdown permit of HCM before attending job.
* Trained workmen should execute the job.
* A crane mounted truck/15T crane operational with competent person is required to be parked near Ground Pusher
* Remove the locking plates of the hood on sides
* Cut the HCM hood into 2 pieces & remove it with help of crane in 2 pieces from gap between Door Handler stiffeners
* Weld the cleats on top of spare hood for handling & slinging purpose
* Attach certified slings to the old hood & hoist it till it moves out of the hotcoke machine
* Remove the old hood & park at a safe location
* Install the new hood in position from Ground pusher side by resting of pusher shield & HCM tray.
* Pull the new hood gently towards HCM on side walls in co-ordinated manner with help of 2 nos of 2T chain pulley block & position at designated location
* After positioning, lock it with locking plates on either sides & L stiffeners on front side
* Do not weld the stiffeners to hood, weld to side walls only
* Shut downs to be released as per Standard procedure.
* Trials to be taken, Check for the Tray movement & should not foul with any door handler, Check for any odd noise.
* Report to the production for further operations once no abnormalities are found.

Close the work permit of the activity from the respective shift in charge and User department.

**Activity No 5 : Replacement of Bogie wheel**

* Take work permit of the activity from the respective shift in charge.
* Identify the boogie wheel that needs replacement.
* Shift the pre lubricated Bogie wheel – LHS / RHS as per the requirement near to the car
* Following will be parking location of HCM for respective replacement
  + Bogie Wheel – 3A : Oven no-1
  + Bogie Wheel – 3B : Oven no-73(Door stand location)
  + Bogie Wheel – 4A : Oven no 3
  + Bogie Wheel – 4B : Oven no 72
* Tools and tackles required to be shifted at same area.
* Shut down of the HCM and DSL needs to be taken.
* Trained workmen should execute the job.
* The adjacent chassis structure of the car needs to be hydraulically lifted(around 50mm) with 150T Bar x150mm stroke jack-1 no to free the Bogie wheel(Avoid contact with rail) for dismantling.
* Loosen the eight bolts(M16x130 HT bolts) and remove the packing above the bogie wheel
* Hydraulic jack of 150 bar should be used by providing the metallic support below the jack cylinder.
* Remove the motor & disconnect the cable if cable is short and cannot be kept on ground else keep it on HCM and secure it with rope
* The wheel needs to be dismantled from the HCM structure by rolling on the rail supported on either sides by crew till it comes in reach of crane for hoisting.
* The new boogie wheel needs to be shifted by means of F-15 crane on the respective rail & then rolled to the position.
* Replace the same with new one and assemble the same with adequate packing.
* Ensure all 8 bolts are freely going and not bent.
* Further assemble the motor.
* Housekeeping needs be done at the area of repair bay by removing the tools, tackles and scrap.
* Motor to be terminated for supply if removed
* Fill the gearbox with Omala 320 oil if not prefilled
* Shut downs to be released as per Standard procedure.
* Trials to be taken, Check for the wheel movement, check for any odd noise.
* Hand over the equipment for the operation department for starting the production once the equipment operation found healthy.
* Close the work permit of the activity from the respective shift in charge and User department.

**Activity No 6 : Door Handler replacement – HCM**

* Position & align the machine near Oven no-1 at extreme position without touching the end stopper
* Position the door handler and rest it on forward/reverse bottom winkle roller guides
* Take electrical shutdown of HCM & HCM-DSL & work permit for the job.
* Adequate cooling of car to be done with water to the satisfaction of requesting engineer
* Cover the oven door on HCM side with ceramic wool to reduce heat transfer towards HCM
* Position 120T crane adjacent and parallel to the HCM for dismantling of door handler & associated hydraulic cylinders
* Appropriately mark the location of bottom winkle roller guides before dismantling, do not remove/disturb the top Forward/Reverse winkle roller guide(To be kept as reference)
* Arrange to get SSI cables disconnected for Door handler cylinders- 4 nos through Electrical department
* Remove the vertical hydraulic cylinders one after another, then remove horizontal hydraulic cylinders, then door handler structure & winkle roller (WR)bottom guides with help of crane.
* The hydraulic hoses loose end to be covered with cotton cloth to avoid contamination
* Clean and carry out surface preparation of removed bottom guides
* Install the new door handler structure in position after fixing one bottom WR guide. Then install the other bottom WR guide.
* Install the forward/Reverse cylinder-2 nos and connect the clevis to door handler fork.
* Install the Lifting/lowering cylinder-2 nos and connect the clevis to door handler fork.
* Connect the hydraulic hoses to respective cylinders and restore SSI cable connections to cylinders.
* Check for center line of door handler & chassis.
* Do not carry out full welding of bottom WR guides, to be done after cold trials
* Carry out lubrication of WR guides, Winkle roller
* Clear electrical shutdown temporarily for trials
* Take trials of door handler without door and check for smooth movement
* Complete full welding of guides and then take trial of door handler in auto mode with door opening & closing operation under close supervision in presence of Operations & Electrical department
* Clear electrical shutdown & Clear work permit

**Activity No 7 : Replacement of Hot Coke Machine Tray cylinder hose .**

* Position the Machine in the repair bay /between oven no-36 & 37 .
* Take electrical shutdown
* Close the Shut off valve below the tray near to tray cylinder.
* Remove the hose pipe, Ensure that the spillage oil is collected in the container.
* Replace the hose.
* Clear the electrical shutdown
* Hand over for operations after taking trials for leakage.

**Activity No 8 : Preventive Maintenance**

Preventive Maintenance of Hot Coke machine is covered under

1. CLTI. (Cleaning, Lubrication, Tightening, Inspection)
2. Monthly Preventive maintenance.
3. Quarterly Preventive Maintenance.
4. Half Yearly Preventive Maintenance.
5. Yearly Maintenance.

CLTI is basically is routine run check inspection and any identified abnormality is documented and updated in SAP in MR Notification. On opportunity the same is resolved and the abnormality is closed.

**Procedure for Preventive maintenance**

* Check the preventive maintenance schedule in SAP.
* Take system generated print of generated PM and hand it over to maintenance crew for execution.
* Isolate HCM with proper isolation procedure as per the Vedanta isolation standard.
* Carry out all tasks mentioned in the checklist as per guidelines and update the job completed and actual conditions with the time taken for completion of the job.
* Ensure all the jobs are completed and in case of any abnormality or pending jobs in the list, a separate notification has to be raised in SAP for ensuring the compliance.
* All unwanted material from the area to be removed before releasing the equipment electrical isolation.
* Follow proper documented procedure for releasing the electrical isolations as per Vedanta approved isolation standards.
* Take trial of machine after job & report abnormality noticed if any.

After completion of PM activity, the generated order needs to be closed within 24 hrs of the execution.

1. **REFERENCES:**

OEM manuals

1. **RECORDS:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sr. No.** | **Record No.** | **Record Title** | **Maintained by** | **Soft/Hard form** | **Retention Time** |
| 1. | - | CLTI | Area in Charge | Hard | 1 Yr. |
| 2 | - | PM Checklist | Area in Charge | Hard | 1 Yr. |
| 3 | - | Notification Data | Area in charge | Soft |  |
| 4 | HI/74 | Hazard Identification | IMS | Soft | 1 Yr. |
| 5 | RA/74 | Risk Assessment | IMS | Soft | 1 Yr. |



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