

Improving Reliability of Stacker Reclaimers

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1. Introduction:

The Stacker Reclaimer - 3 (S/R-3) is designed for bunkering coal to Unit-7 of 500mw capacity. The stacker reclaimer is suitable for building stockpiles of coal on either side of track rails and subsequently reclaiming this coal from the piles and feeding them by working with a reversible boom conveyor for stacking and discharging the same end during reclaiming. S/R plays a major role at the time of crisis; i.e when there is no coal input to the plant, reclaiming is done from S/R to maintain the bunker levels and generation.

2. Brief description of the case:

The Power, Control and Communication cables are routed through the inner slew ring drum. Frequent failures of cables is one of the main causes for non-availability of stacker cum reclaimer-3 which is feeding the 500 MW Unit-7 bunkers.



Figure.1:-S/R features

2.1. Major Causes for Non-availability of S/R-3 :-

1. PLC Communication failure from remote I/O.
2. Damage of Cables in Inner Slew Ring.
3. Trolley frame structure getting damaged.

3.0. PLC Communication failure:-

The PLC communication failure has been avoided by removing OFC cable and by a new profibus communication with new cables routed outside the inner slew ring.



Fig.2. Profibus cable routed outside the inner slew ring

4.0. Trolley frame structure Damages:-

S/R-3 FIXED TROLLEY DAMAGE



S/R-3 BOOM MOVING STRUCTURE TOUCHING THE TROLLEY



4.1 Reasons for damage:-

1. The boom structure while moving at full slew speed and hitting the trolley structure due to inertia.
2. When boom is at full 90 deg with slew end limit acted condition and given travel forward command, then the Boom structure is forced to move back warded (when the bucket is stuck/jam in coal heap) and damage the fixed structure.

Solution-1:-

New logic was incorporated in S/R-3 PLC for long travel forward command. When the slew end limit switch is acted (i.e Boom is in 90 deg.) Long travel forward command is disabled.

Solution-2:-

To control the Slew speed of boom structure the speed control limit switch are placed before the end limit switches. The slew speed is reduced to 40% before the slew end limit (i.e Boom is in 90 deg.) is reached.



Fig.3:- Slew Speed reduction Switch

5.0. Re-routing of cables to avoid damage:-

5.1 Routing of cables before modification:-

All the power, control and communication cables were laid from lower MCC to upper frame through inner slew ring.

- On a helical plate, cables are dressed on two rounds of plate for expansion and compression movement.
- The plate is welded on either sides of moving and fixed body.
- Rollers are provided on the bottom of the plate for movement while slewing
- The helical plate expands on moving from -90 deg to +90 deg. And so the cable on it.
- Over the period, all the cables failed due to Mechanical jamming of rollers and other associated problems and the reclaimers were running with cable joints.
- The slew ring hull gets filled with coal dust and the wheels get jam.
- Any leakage coal is getting accumulated in the gap of plates.
- The compression and expansion of the helical plate is not possible ;with this the cable comes under stress and resulting in cables damage.
- The rubber cables were frequently getting damaged.



Fig.4:- Cables Damaged

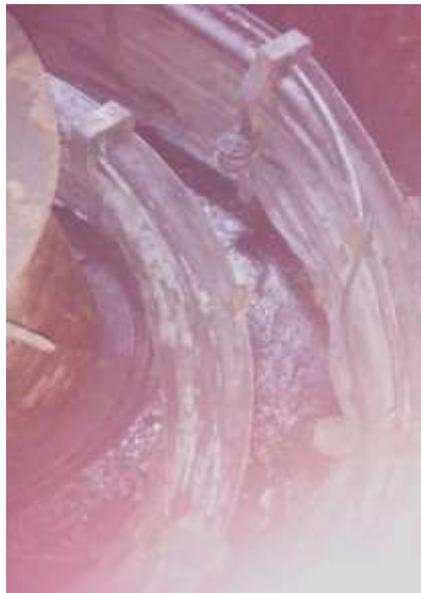


Fig.5:-Cables dressed on the Helical plate

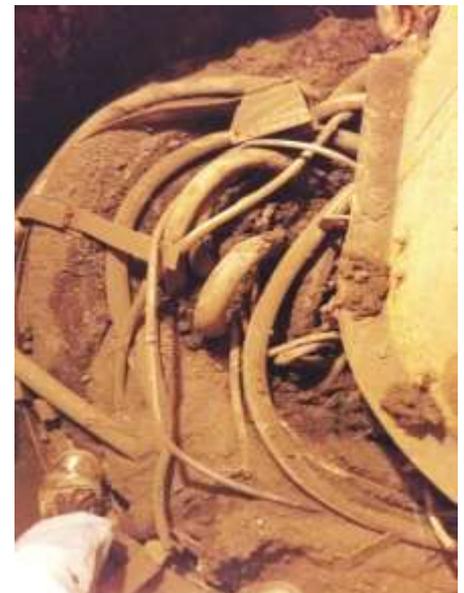


Fig.6:-Cables and rollers in jam cond.

Joining of the damaged cables in Inner slew ring was taking long hour due to limited Ventilation, Space, Access & Lighting. There were occasions of helical plate getting damaged, Boom Motor got burnt due to single phasing, Helical plate end welding failed due to jammed rollers below the plate.

5.2. Preparatory works for Re-routing of Cables:

New tray route to accommodate the power, control and communication cable was identified in coordination with CHP-MMD. The works completed before shut down

- Required cable tray welded at fixed and moving body
- HDPF pipe kept ready for remote I/O panel communication cable.
- Cable moving part hinge supports made ready



Fig.6:- Hinge support for Cable movement



Fig.7:- New Cable trays laid

5.3. Works carried out :-

Permit taken and inner slew ring cleaning including cables trays done. Marked cable before removal and cables laid in the new route. Cable straight through jointing done. Un-used cables were removed.

5.4. System checking before hand over:-

Checked the cable's healthiness & terminations, power supply restored. Trail taken for all the drives and given in service.



Fig8:- Before modification



Fig9:-After modification

6. Conclusion as learning from the case:

The power control and communication cables should be routed through the fixed structure by adequate loop in cables to the moving Boom structure to improve the safety of the personal and equipment; also to improve the working condition of the personal.

Upcoming projects may consider the same for improving reliability and availability of Stacker Reclaimers.