110.Overhauling of RAPH:

110.10 Activity- Overhauling of RAPH

RAPH Overhaul consists of Overhauling of Air preheaters of Unit#2: - Two Nos. Make – BHEL, Size – 31.5 VIM 2000 (50 Deg PA). Brief Scope of work is as under:

1. RAPH total jobs must be completed within 20 days. Bidder shall mobilize resources and manpower accordingly to carry out 24 hours basis parallel work in both RAPH.
2. Opening /Closing of manholes to start and completion of work. Replace rope, gaskets, bolts, hinges etc.
3. Scaffolding preparation at Bottom side (Cold End) for old seal removal & basket removal and reinstallation of new baskets, seals and soot blower work.
4. Remove/Inspect/replace – radial /axial/ circumferential seals on rotor.
5. Remove/replace bypass seals, basket bypass seals, axial seals, radial seals, circumferential seals, rotor post & hub seals. Set seal clearances to values specified as per OEM.
6. All intermediate and cold end gratings to be inspected and repaired/replaced as instructed by EIC.
7. All T-bar to be inspected and repaired/replaced as instructed by EIC.
8. All Hot, Intermediate and cold end baskets to be removed and brought down to boiler zero meter at designated area. High pressure cleaning of these baskets will be in the scope of bidder.
9. All elements of Baskets need to be light pass tested before installation. In case of deviation, the same need to be cleaned and re-installed.
10. Bidder shall lift washed baskets from zero meter and fix in respective RAPH.
11. In case of expansion of baskets of RAPH, the same need to be repaired by compressing/removal of additional heating elements etc to restore original basket dimensions
12. Bidder need to mobilize sufficient Winches (minimum-3 No of 3 ton) and hoists for parallel working at both RAPH. All the winches and Hoists to be certified by MPL/ Competent 3rd part inspector.
13. **Bidder must carry minimum two no of hydraulic hand pallet trolley for basket shifting.**
14. Inspection of sector plate, center section plate, axial seal plate, static seals etc. Inspection of sector plate for corrosion, inspection of adjuster mechanism, freeness to be checked and same must be repaired (if any). Level sector plates, adjust ‘T’ bar high point, rotor post clearance on hot ends and cold ends, inspection of all static seals for erosion, replacement if required, rotor levelling etc.
15. Checking, alignment & correction of all GAH drives.
16. Air leak test before & after overhaling and attend all the leakages.
17. Assisting in RAPH DV testing and repair/ replacement of nozzles if any.

Basket Replacement at Cold End:

1. Remove CE basket removal door from housing panel as well as from the rotor segment.
2. Withdraw the cold end baskets. Total baskets-480 no's (approx. wt. 250kgs)
3. Water jet cleaning of all the baskets.
4. Eroded Cold end and intermediate basket grating repairing/replacement.
5. Either replace the baskets upside down or replace with new baskets as per instruction of EIC.
6. Removal of insulation and fixing of new insulation if required for RAPH job shall be in bidder’s scope. Insulation material will be provided by MPL.

NOTE: when removing the baskets completely remove the baskets diametrically opposite sectors to prevent excess unbalance of the rotor. Shifting of new baskets from store to site and return the damaged baskets to store shall be in bidder's scope.

Basket replacement of Hot end and Intermediate end

Removing Hot end baskets:

1. Removal of insulation require for the job.
2. Open hot end basket removal door provided in gas inlet.
3. Remove the radial seals.
4. Remove the hot end basket through basket removal door. Total basket-432 no's (approx. Wt. 500 kg)
5. Jet cleaning of all the Baskets
6. Either replace the baskets upside down or replace with new baskets as per instruction of EIC.

Removing Intermediate baskets: -

1. Removal of insulation require for the job
2. Open hot end basket removal door provided in gas inlet
3. Remove the radial seals
4. Remove the hot end basket through basket removal door. Total basket-432 no's (approx. Wt. 500 kg)
5. Jet cleaning of all the Baskets
6. Either replace the baskets upside down or replace with new baskets as per instruction of EIC.

Note: -When removing the baskets completely, remove the baskets diametrically opposite sector to prevent excess unbalance of Rotor. Minor repairing of diaphragm/ partition plate (hot end & cold end) by welding/grinding/patching.

High pressure water jet pumps and connections will be in Bidders scope.

General Inspection and Cleaning of RAPH:

1. Hot washing of RAPH to be done. Ash accumulated in the following areas to be removed.
    a. Center-section (hot end) – entire guide bearing area.
    b. Ash cleaning up to PA and SA outlet damper and its surrounding area will be in RAPH scope.
    c. Over the sector plates and bellows.
    d. Around support bearing.
    e. Around the Pin rack assembly and in the Pinion housing cover.
2. Ash is to be collected in gunny bags and shifted to zero meters and later-on to be dumped to ash dyke.
3. Necessary platform for element loading and replacement. Hoist/lifting arrangement for baskets removal and fixing.
4. Air motor maintenance - Servicing of Air Motor, checking of its internals and its trial.
5. Repair and maintenance of sector plates and its static seals. If required some portion of the sector plates to be replaced with new one.
6. Fixing of new static seal in all cold end sector plates and axial seal plates.
7. Repairing /replacement of hot end and cold end rotor housing static seals.

8. Replacement of defective water washing nozzles.
9. Replacement of cold end and hot end T-bar L-tab and damaged fasteners.

Guide Bearing and Support Bearing Servicing:

1. The bearing housing cover, pipeline connections and fittings are to be dismantled.
2. Drain / Remove the Oil / Grease from the Housing.
3. All components including oil tank and its fittings are to be thoroughly cleaned with diesel and compressed air.
4. Inspection of all components is to be carried out.
5. Clearance between housing and bearing, roller and outer race to be recorded.
6. All gaskets and ropes are to be replaced.
7. Re assembly of components as per the instruction of EIC.
8. New Oil / Grease to be filled in the housing.
9. Guide fixtures of the bearing housing are to be checked and rectified.
10. Bearing housing level to be checked and recorded.
11. Reassemble all connections of the bearing housing.

Checking of Rotor Run Out:

1. Run out of both top and bottom flanges of air heater rotor as well as cog rim to be checked and recorded.
2. High point of rotor flanges to be marked.

Rotor Levelling:

1. Rotor to be leveled as per quality norms by adjusting the jack bolts of guide bearing housing.
2. Foundation bolts to be tightened.
3. Defective fasteners / lock plates found damaged, are to be repaired or replaced.

Servicing and Replacement of Trunnion Shaft Seal:

1. Dismantling of trunnion shaft seal. Cleaning of Trunnion housing.
2. Replacement of Kao wool.
3. Replacement / repair of defective component.
4. Reassembly of components.

Maintenance of Sealing Systems of Air Preheaters:

a. Levelling of Hot End & Cold End Radial and Axial Sector Plate:

1. Fix the finger tabs at inboard and outboard.
2. Record the previous setting readings of sector plate.
3. Level the sector plate as per requirement.
4. Repair/replace the sector plate actuating mechanism, if required.
5. Lock the sector plate after completion of leveling.

b. Hot End and Cold End Radial Seals Repair/ Replacement and Setting:

1. Fix the straight edge to set seals at pre-determined seal leaf to sector plate gap, as directed by the EIC.
2. Loosen all fasteners of the seals to be set.

3. Replace all the worn out / damaged fasteners and seals.
4. Set all the seals one by one against straight edge and tighten all the seal fixing bolts & nuts. Lock the adjusting mechanism.
5. Set all the seals of every sector in the same way.
6. Remove the straight edge and check free rotation of the rotor by rotating by air motor.
7. Attend to the defects, if any.

c. Axial Seals Repair/ Replacement and Setting:

1. Fix the straight edge to set seals at pre-determined seal leaf to sector plate gap, as directed by the EIC.
2. Loosen all fasteners of the seals to be set.
3. Replace all the worn out / damaged fasteners and seals.
4. Set all the seals one by one against straight edge and tighten all the seal fixing bolts & nuts. Lock the adjusting mechanism.
5. Set all the seals of every sector in the same way.
6. Remove the straight edge and check free rotation of the rotor by rotating by air motor.
7. Attend to the defects, if any.

d. Bypass Seals Repair/ Replacement and Setting:

1. Loosen all fasteners of the seals to be set.
2. Replace all the worn out/damaged fasteners and seals.
3. Set all the seals one by one and tighten all the seal fixing fasteners.
4. Check the free rotation of the rotor by rotating with the air motor
5. Attend to the defects, if any.

e. Center Section: Repair/ Replacement of damaged Cover Plates and Seals between Sector Plates and Center Section:

1. Cut the protection cover plates of the bellows between the sector plate and the center section and remove.
2. Loosen all the fasteners connected to the bellows.
3. Remove the bolts connecting the center hub halves.
4. Remove the center hub halves.
5. Remove the damaged bellows after cleaning the ash deposits.
6. Bring new bellows from MPL stores and fit the same in position.
7. Fit and tighten the bolts.
8. Fit the center hub halves and tighten the bolts.
9. Fit new seal plates and cover plates and weld them in one end.

f. Servicing RAPH Soot Blowing system:

1. Servicing of drive system.
2. Soot blowing swivel movement checking.
3. Nozzle inspection/replacement.

g: RAPH Rotor Drive System:

1. Oil inspection/replacement.
2. Pinion teeth inspection.
3. Pinion/pin rack gap checking.
4. Alignment of Drive system.

5. Oil seal checking and replacement, if required.

NOTE: During trial run, if any abnormality found in the RAPH assembly, necessary correction for the same should be again carried out to satisfactory trial run free of cost.

110.20. RAPH Main Drive Gear Box Replacement-2 No.

1. Removal of fluid coupling
2. Removal of motor from base.
3. Opening of gear box bottom cover.
4. Removal of Worthington hub and Pinion.
5. Removal of old gear box from base.
6. Erection of lifting arrangement for Gear Box shifting. Lifting arrangement materials and erection is in bidder scope.
7. Shifting of old gear box from RAPH floor to ground floor.
8. Lifting of repaired gear box from ground floor to RAPH floor.
9. Cleaning of gear box and foundation base.
10. Lifting of gear box from RAPH floor to base.
11. Installation of Pinion and Worthington hub.
12. Alignment of Gear Box & Pinion.
13. Pinion root & gap alignment.
14. Motor and gear box alignment.
15. Motor decouple trial.
16. Motor and gear box coupled trial.

110.30. RAPH Hot End Sector Plate Replacement-3 No.

1. Opening of hot end basket removal door.
2. Removal of hot end radial seal.
3. Removal of hot end sector static seal
4. Removal of Hot end rotor post seal.
5. Removal of one sector complete hot end baskets.
6. Inspection of all three hot end sector plate.
7. Removal of hot end sector plate.
8. Shifting of old sector plate from RAPH floor to ground floor.
9. Lifting of new hot end sector plate from ground floor to RAPH floor.
10. Installation of new hot end sector plate.
11. Installation of sector plate adjustment assembly.
12. Sector plate alignment.
13. Installation of all static seals.
14. Installation of Rotor post seal.

120. RAPH Optional activities

120.10 Guide bearing replacement-2 no (Optional)

Scope comprises: -

1. Removal of all connection to the guide bearing.
2. Guide bearing oil to be drained.
3. Removal of guide bearing housing cover.
4. Removal of locking cap bolts.
5. Removal of locking cap.
6. Removal of adaptor sleeve.
7. Removal of guide bearing housing sleeve.
8. Removal of guide bearing.
9. Shifting of new guide bearing from store to APH floor.
10. Cleaning of new guide bearing.
11. Proper cleaning of guide bearing housing, and its all components.
12. Installation of new guide bearing.
13. Installation of adaptor sleeve.
14. Guide bearing alignment as per OEM guideline.
15. Filling of oil up to the normal level.
16. APH trial by Air motor & Main motor.
17. If any abnormality found during trial and within one year of operation vendor will rectify the same without additional cost.

120.20 Support bearing replacement-2 no (Optional)

Scope comprises: -

1. Removal of all connection from support bearing.
2. Support bearing oil to be drained.
3. Removal of support bearing housing cover.
4. Lifting of RAPH Rotor with the help of hydraulic jack.
5. Removal of adaptor plate.
6. Removal of support bearing housing.
7. Removal of support bearing.
8. Shifting of new support bearing from store to APH floor.
9. Cleaning of new support bearing.
10. Proper cleaning of support bearing housing, and its all components.
11. Installation of new support bearing.
12. Installation of adaptor plate.
13. Support bearing alignment as per OEM guideline.
14. Filling of oil up to the normal level.
15. APH trial by Air motor & Main motor.

If any abnormality found during trial and within one year of operation vendor will rectify the same without additional cost

MPL scope:

1. Fasteners, spare parts, structural steel, plates & pipes etc for replacement.
2. Refractory & Insulation materials.
3. 440/230V supply will be provided at nearest designated points.
4. Workers Canteen facility. Vendor must arrange food for their workers at his own cost.
5. Dark room facility only for RT film development However chemical and other requirement will be under bidder scope.
6. Functional Workshop for general machining job, however if any complicated machining is required that will be under party scope.
7. Free of cost water and electricity will be provided by MPL

Sl. No		Overhauling of RAPH	UOM	Qty
110.00		**Overhauling of RAPH**		
110.10	4062943	Overhauling of RAPH	AU	1
110.20	4165267	RAPH Gear Box Replacement	EA	2
110.30	4124620	Hot end sector plate replacement	EA	3
120.00		**RAPH Optional Activities**		
120.10	4165268	Guide Bearing Replacement (Optional)	EA	2
120.20	4165269	Support Bearing Replacement (Optional)	EA	2

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