Minutes of meeting held between M/s M.R. Krishnamurthy Coop. Sugar Mill Ltd. And M/s Triveni Turbines Ltd. Bangalore at Sethiyatope regardingOverhauling of TG set. Dated on 15.12.2018

Turbine Details: -

Power Turbine

Frame- Fr-14A
Rating- 2500 KW
Inlet Temperature- 390 deg C
Speed- 9000 RPM
Driven Machine-Alt./Jyoti Ltd.

Sl. No,- 038
Inlet Pressure-40 ATA
Exhaust Pressure-1.2ATA
Critical Speed- 9900 RPM

Frame- Fr-14A
Rating- 2500 KW
Inlet Temperature- 390 deg C
Speed- 8325 RPM
Driven Machine-Alt./ BHEL

Sl. No,- 141
Inlet Pressure-40 ATA
Exhaust Pressure-1.2ATA
Critical Speed- 9158-9574 RPM

Mill Turbine:-

Frame- 525 M/M
Rating- 350 H.P.
Inlet Temperature- 734 deg C
Speed- 6637.5 RPM
Driven Machine-Mill

Sl. No,- 55/52/53/75
Inlet Pressure-40 ATA
Exhaust Pressure-1.0ATA
Critical Speed- 7300-7630 RPM

Fibrizer Turbine:-

Frame- 525 M/M
Rating- 700 B H.P.
Inlet Temperature- 734 deg C
Speed- 6637.5 RPM
Driven Machine-Fibrizer

Sl. No,- 56
Inlet Pressure-40 ATA
Exhaust Pressure-1.2ATA
Critical Speed- 7300 - 7630 RPM

Members Present:-

M/s M.R.K. Coop.

Mr.Chenguttuvan (Dy. C.E.)
Mr.Sarvanan (J.E.)
Mr. Suresh (A.E.)

M/s TTL

Mr.JyotishmanBhowal
Mr.NagababuBathineedi

- M/s TTL engineer Mr.NagababuBathineedireached site on 10.11. 2018 for carrying out TG set overhauling work. Mr. JyotishmanBhowal reached site on 17-11-2018 for the same.

Fr-14A (38/141)-

- All internals cleanup checked and observed not satisfactory from customer end and cleaning done
- Rotor blades and diaphragm condition checked and no further wear observed on diaphragms compared to previous conditions.But blades are highly wornout condition (sl No.-38) hence M/s TTL recommends rotor reblading at TTL works
- Bearings of turbine& gearbox, turbine and alternator checked visually checked and no cracks observed except light scoring marks, Heavy rubbing observed in alternator NDE bearing.
- Bottom half diaphragms, laby holders with packing, pinion and gearwheel assembled into turbine and gearbox casings and all checked done as per protocol and recorded. Protocol to be referred for the same
- Casing studs and cap nuts of both H.T. and L.T. sets observed worn out and needs replacement. M/s TTL recommends procurement of spare studs and cap nuts for replacement in next season
- H.P, Interstage and L.P. steam and oil seal laby packing clearances are observed on higher side sl no. 38 L.T. set and due to non-availability of spares could not be replaced. Hence customer complaint of steam leakage and condensate in oil issue could not be addressed. M/s TTL recommends to procure the same for replacement in next overhauling season
- Welding observed in overspeed trip assembly suggesting overspeed trip adjusted to below design value. Since this was carried out long back, hence not disturbed
- Oil inlet fitting of L.T. turbine observed worn out and due to non-availability of spare could not be replaced, M/s TTL recommends to keep oil inlet fitting as spare during overhauling season for replacement
- Alternator NDE bearing clearance was observed on higher side with heavy rubbing on bearings for L.T. set (Sl. No.-38). Due to non-availability of spare bearings, could not be replaced.
- M/s TTL recommends keeping bearings of turbine, gearbox and alternator as spares during season in case of bearing failure
- Throttle valves of both L.T. set (sl No.-38) and H.T. set (Sl No.-141) observed worn out and could not be replaced due to non-availability of spares & should be replaced in next overhauling season
- Actuator drive shaft ball bearings of sl no. – 141 observed worn out and due to non-availability of spare ball bearings could not be replaced. M/s TTL recommends ball bearing replacement in next overhauling season

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- AOP pump of H.T. turbine of Sl No.- 141 observed not developing required pressure for rolling and hence recommends replacement with new spare. M/s TTL recommends for procurement the same
- Relay oil cylinder o-rings for both STG needs to be replaced in next season due to their worn out condition
- M/s TTL observed, TG oil which M/s MRK claims to be ISO VG 68 grade oil which is at deep red in colour &which is not satisfactory and recommended changing of oil to fresh oil of grade ISO VG 68 or ISO VG 46. Oil was changed by M/s MRK before re-commissioning. However the oil was contaminated and was not satisfactory before start of commissioning and was checked by M/s TTL. Hence M/s TTL recommends for oil quality test and further filtration of oil.
- Both STG's were re-commissioned on 14-12-2018 and all temperature and vibration parameters observed normal and satisfactory.
- Alternator of Jyoti make L.T. set (STG Sl No.- 38) moderate vibration observed which got reduced after loading of STG. M/s TTL recommends alternator re-cantering in next overhauling season with bearing replacement
- Mechanical over speed trip for both STG observed are as follows:-
    - L.T. set (Sl. No.-38)- 9730 RPM
    - H.T. set (Sl. No- 141)- 8750 RPM
- Mechanical overspeed observed on lower side and M/s TTL observed welding in overspeed trip valves and requests to procure the overspeed trip valves and springs for replacement in next overhauling season
- During mechanical overspeed trip test of H.T. set (Sl. No. 141) M/s TTL observed problems with woodward 505 electronic governor along with its display system.
- M/s TTL recommends both H.T. and L.T STG governors be checked by M/s TTL electrical personnel and take his recommendations.

FR-525 M.M. (Sl. no. 55,52,53,75 and 56)

- Gearwheel fore and after bearing of Mill turbine no.-53 (Mill-1) observed in severe rubbed condition and only gearwheel after bearing with re-white-metalling was available which is not of good quality. M/s TTL does not recommend the same and will not take responsibility, if failure of bearing during running.
- Dent marks observed in bearings which was reported earlier and could not be replaced due to spare shortage. Hence will be replaced in next season
- Cam shaft of Sl. No.-53 Mill-4 observed in worn out condition and moderate damage observed. M/s TTL recommends replacement in next overhauling season
- Thrust wear trip lock spindle with spring observed worn out and was not functioning properly. Already lock spindle was changed with spare and tripping was observed working satisfactory. However lock spindle spring is not functioning correctly and needs to be replaced on urgent basis for Mill-2 (Sl. No.- 75)
- M/s TTL recommends keeping one set of bearings, throttle valves, MOP and PTV valve spares
- Mill and fibrizer turbines were re-commissioned on 14-12-2018 and all bearing temperatures and vibration parameters observed normal and satisfactory. Mechanical overspeed tripping done and tripping are as follows:-
    - Mill-1- 7000 RPM
    - Mill-2- 7000 RPM

- Mill-3-7600 RPM
- Mill-4-6900 RPM
- Fibrizer- 7600 RPM

- However M/s TTL observed all speed indicators not calibrated as per requirement and RPM output from tacho-generators had to be checked using multimeter and calculations and about 200 - 500 RPM difference was observed between speed indicators of field and panel reading. Hence calibration done by M/s MRK of the speed instruments is not upto the mark. M/s TTL recommends re-calibration of all RPM instruments and notifies the RPM difference between multimeter and speed indicators should not be more than 50 RPM.

Further note:-

- M/s TTL requests M/s MRK to fix all steam line leakages properly without fail and all steam drains should be vented out of the plant
- M/s TTL engineers left site on 15-12-2018

Copy of documents submitted along with MOM:-

1) Time sheets
2) Protocols
3) Spare recommendation list

M/s M. R. K. Coop.

15/12/18
DyCE. MRKCOOP

M/s TTL

15/12/18.