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NO/GCOEARA/Mech/CMS-SVK/CON/2023/462.

Date: 17/10/2023

To,

The Chief Engineer,

Thermal Power Station, Parli-V,

Maharashtra State Power Generation Co. Ltd.,

Parli

Kind attention: Executive Engineer, TM-NPTPS, Parli-V

Subject: Final report of inspection of four schemes under DPR 1 of the PO No under reference below

Reference: PO NO. PRLTPS/4550019314 dated 28th Sep 2023

Dear Sir,

With reference to above we have completed the work of inspection for the schemes proposed under DPR 1 as per the PO No. PRLTPS/4550019314 dated 28th Sep 2023. We are thankful to the cooperation extended by the concerned engineers for completing this study. Please find attached herewith the final report of inspection for your reference and necessary action.

Thanking you and assuring you our best services.



Yours faithfully

Dr. D. R. Pangavhane

(Dr. D. R. Pangavhane)

PRINCIPAL

PRINCIPAL

Govt. College of Engineering
and Research Avasari,
Tal. Ambegaon, Dist. Pune



FINAL REPORT

(PO NO. PRLTPS/4550019314 28th Sep 2023)

ON

Inspection of "DPR on Refurbishment of Designing, Erection & Commissioning of Energy Efficient Air Temperature Controlling system at U#6,7; Upgradation of reciprocating compressor into screw compressor at U#6; Refurbishment of spare HPT Module and Upgradation of existing chiller AC plant of area PCR, Service Building and VFD area at Unit#6 TPS, Parli-V"

STUDY CONDUCTED BY:
GOVERNMENT COLLEGE OF
ENGINEERING AND RESEARCH,
AVASARI KHURD

ACKNOWLEDGEMENT

Work of inspection of damaged/running/failed parts of existing spare HPT Module, Air Temperature Controlling system, Chiller AC plant and Air compressor unit at Unit# 6 & 7 NPTPS, Parli was carried out by Government College of Engineering and Research, Avasari (Kh) during the month of October-2023. We express our sincere thanks to the Superintending Engineer, Executive Engineer, Addl. Executive Engineer and Engineers of TPS Parli for their valuable co-operation and support extended for successful completion of the test. We also sincerely thank to Principal, GCOEAR, Avasari (Kh) for his co-operation for the successful completion of the study.

GOVERNMENT COLLEGE OF ENGINEERING AND RESEARCH,

Avasari - Khurd, Taluka - Ambegaon, Maharashtra 412405

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1.0 INTRODUCTION

New Parli Thermal Power station of MAHAGENCO is having installed capacity of 750 MW. There are 3 units of 250 MW. The Unit#6, Unit#7 & Unit#8 are commissioned in 2006, 2010 & 2016, respectively. Unit # 6 has completed 16 years of service & Unit 7 has completed 12 years & Unit # 8 has completed 06 years of service as the plant is continuously in service to fulfil generation demand of MSPGCL. This report presents the facts about the health and conditions of the various systems and components of the detailed project report (DPR) on Refurbishment of Designing, Erection & Commissioning of Energy Efficient Air Temperature Controlling system at U#6, 7; Upgradation of reciprocating compressor into screw compressor at U#6; Refurbishment of spare HPT Module and Upgradation of existing chiller AC plant of area PCR, Service Building and VFD area at Unit#6 TPS, Parli-V. There are total four schemes under this DPR as mentioned below:

Scheme number	Scheme title
1.1	Designing, Erection & Commissioning of Energy Efficient Air Temperature Controlling system at U#6,7
1.2	Upgradation of reciprocating compressor into screw compressor at U#6
1.3	Refurbishment of spare HPT Module
1.4	Upgradation of existing chiller AC plant of area PCR, Service Building and VFD area at Unit#6 TPS, Parli-V

The brief about these systems is provided below:

1.1 Designing, erection & commissioning of energy efficient air temperature controlling system at U#6, 7

At Unit 6 & 7, M/s Polcon make total 13 number of Air Washer (cooling) Units of 130000 m³ & 60000 m³ capacities are installed for supporting cooled air to TG Floor, TG Basement, HT & LT switchgear rooms, Battery Rooms, SWAS Labs & VFD breaker room. Therefore, it is essential to enhance the performance of the system by design, erection & commissioning of energy efficient air washer system at 250 x 2 MW NPTPS Parli-V.

1.2 Upgradation of reciprocating compressor into screw compressor at U#6

Air compressor system which includes INSTRUMENT AIR COMPRESSOR (IAC) & SERVICE AIR COMPRESSOR (SAC) are vital for all pneumatic auxiliaries, control valves & damper operation system. Six numbers of M/s Kirloskar make (Model No.: T-BTD-RM) make



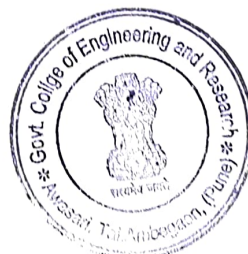
air compressors are installed and are in continuous service for unit #6. Out of six compressors, three instrument air (2 working+1 standby) and three service air (2 working + 1 standby) need to be in service.

1.3 Refurbishment of spare HPT Module

The scheme is related to refurbishment of spare high pressure turbine (HPT) module for Unit 6, 7 & 8 which was removed from Unit 6 to have better inter-stage sealing, better efficiency up to designed efficiency and to have improved *turbine heat rate*. The refurbished HPT module can be used in Unit 6, 7 & 8 of Parli TPS as well as Unit 4 & 5 of Paras TPS as a common pool item. Many emergencies may arise due to any failure in the running unit or during capital overhauling of unit. This will result in improving reliability as spare module available can be replaced during any unforeseen emergency condition. Also, this will help to reduce machine downtime during replacement of module in the event of failure on account of HP Turbine failure.

1.4 Upgradation of existing chiller AC plant of area PCR, Service Building and VFD area at Unit#6 TPS, Parli-V

In Unit#6, currently 3 nos. of M/s Blue star make 170 TR Water Cooled reciprocating chillers are installed along with 3 nos. of condensate water pump, 03 nos. of chilled water pump, 08 nos. of AHU and 03 nos. of cooling tower for maintaining temperature of PCR, VFD room and service building. PCR temperature and VFD room temperature needs to be maintained below 22 °C. If these room temperature increases then various critical auxiliaries electronics card gets damaged resulting in malfunction of this auxiliaries and tripping of unit. Out of these 3 chillers, 2 chillers are in operation & one chillier remains stand-by.



2.0 PROJECT TEAM

The inspection of the current DPR was carried out by the following experts nominated by Government College of Engineering and Research Avasari (kh).

Sr. No.	Name of the official	Designation
1	Dr. C. M. Sewatkar	Associate Professor in Mechanical Engineering, GCOEAR Avasari (kh)
2.	Dr. S. V. Kshirsagar	Associate Professor in Mechanical Engineering, GCOEAR Avasari (kh)

The team visited the New Parli Thermal Power station of MAHAGENCO at Parali on 2nd and 3rd October 2023 for the inspection of the current schemes under the DPR on Refurbishment of Designing, Erection & Commissioning of Energy Efficient Air Temperature Controlling system at U#6, 7; Upgradation of reciprocating compressor into screw compressor at U#6; Refurbishment of spare HPT Module and Upgradation of existing chiller AC plant of area PCR, Service Building and VFD area at Unit#6 TPS, Parli-V.



3.0 OBJECTIVE

With reference to the PO No.: PRLTPS/4550019314 dated 28th Sep 2023 the third party inspection of DPR 1, titled '*Refurbishment of Designing, Erection & Commissioning of Energy Efficient Air Temperature Controlling system at U#6, 7; Upgradation of reciprocating compressor into screw compressor at U#6; Refurbishment of spare HPT Module and Upgradation of existing chiller AC plant of area PCR, Service Building and VFD area at Unit#6 TPS, Parli-V*' was to be carried out with following objectives:

1. To inspect the existing air washer system at Unit# 6 & 7 for its functioning and effectiveness and make the appropriate suggestions for the Upgradation of the system
2. To evaluate the proposition of replacing the existing reciprocating compressor with screw compressor for better availability of the compressed air.
3. To understand the health and condition of the existing spare HPT module and to suggest the remedies for its refurbishment.
4. To inspect the complete chiller systems at Unit# 6 & 7 for its functioning and effectiveness and to suggest the steps to upgrade the system.



4.0 INSPECTION AND RECOMMENDATION

The expert team from Government College of Engineering and Research Avasari (Kh) visited the actual site on 2nd & 3rd October 2023 at New Parli Thermal Power Station, Parli. The systems and components of all the four schemes under DPR 1 were thoroughly inspected during the visit. The important observations and findings during the inspection are provided here for all the four schemes.

Scheme 1.1: Designing, erection & commissioning of energy efficient air temperature controlling system at U#6, 7

The air temperature controlling system mainly comprises of air washers which are proposed to be replaced in the current scheme. There are total 13 air washers at Unit#6, 7 (including VFD control room). Among these air washers 11 air washers are proposed to be replaced. These air washers are thoroughly inspected and followings are the important observations:

1. GI Ducting Network of Unit#6 & 7 plant is having undesirable opening at many points, leading to serious leakages at various locations. This causes more consumption of electricity for the operation of blowers. The velocity control devices are missing at many points or broken at various points. Due to blockage in ducting supplied air from conventional air washing plant is not getting up to final location with desired volume.

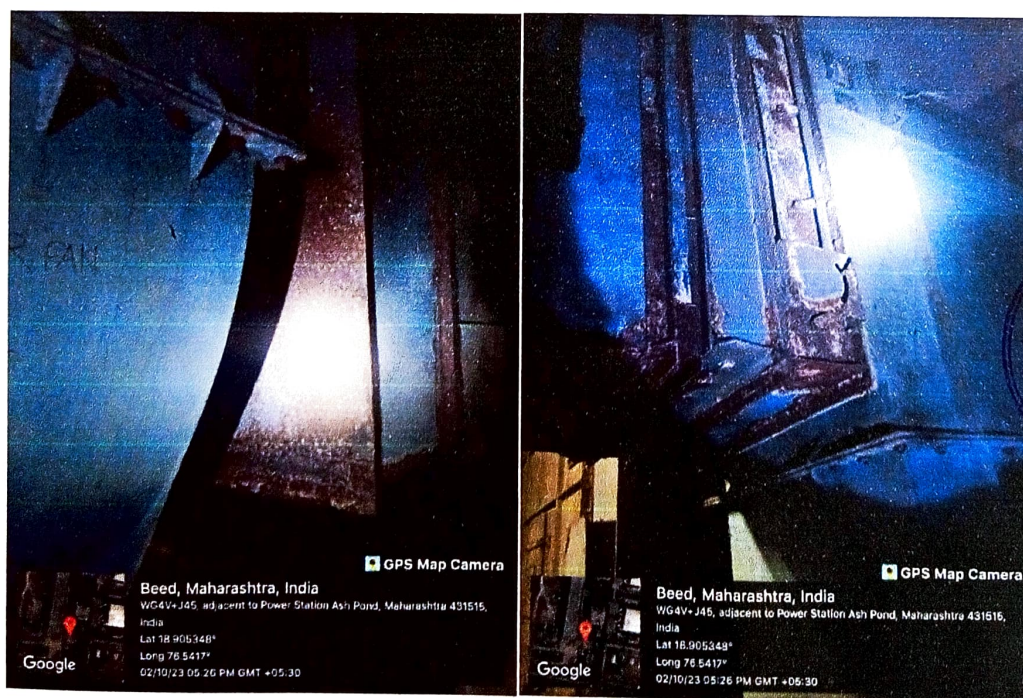


Figure 1.1: Rusted ducting of the air washer unit

2. The electric motors provided for the various purposes like recirculation pumps, air blower etc are worn out and hence completely irreparable as depicted in figure 1.2. The motors are

not in the running conditions and hence difficult to estimate the power consumption. In the absence of these motors air temperature control is not possible.

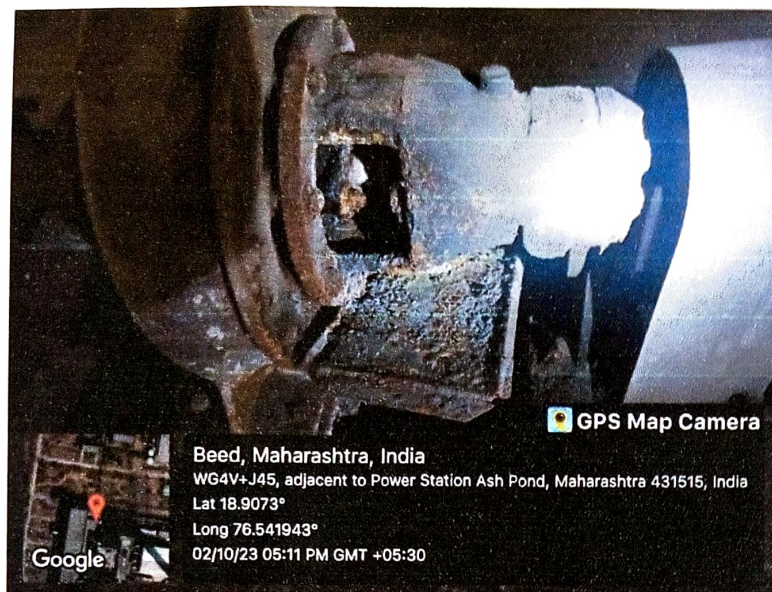


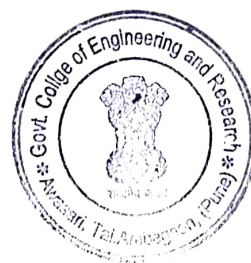
Figure 1.2: Worn out electric motor

3. The blowers are also not working as these are heavily rusted as shown in Figure 1.3. Due to heavy rusting the efficiency of blowers is reduced drastically and it is unable to provide required discharge of the air leading to failure of the operation of unit. It is important to note that the blowers are not being used since last many days.



Figure 1.3: Condition of the blower wheel for air washer

4. The filters are also not working as many of these are completely choked or deformed abnormally.



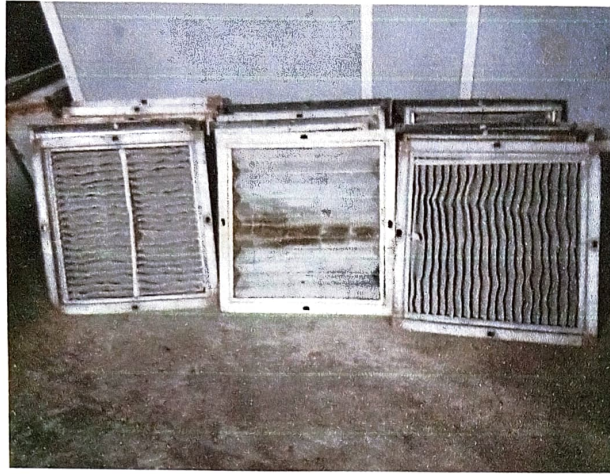


Figure 1.4: Damaged filters used for the air washer

5. The foundation of the blower unit is collapsed and damaged severely. The vibrations developed by the blowers due to this cannot be sustained which may lead to catastrophic damages.

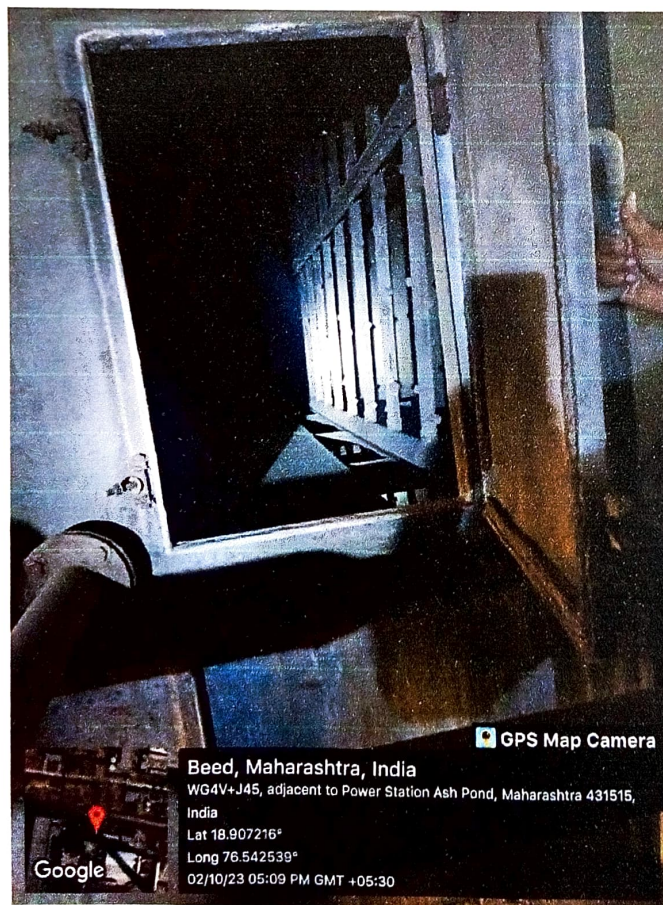


Figure 1.5: Depiction of damaged foundation of the blower unit.

6. The ventilation system is severely damaged and non-repairable. Leakages in the ventilation system leads to huge amount of energy loss and the air cannot be taken to the desired

location. It causes more power consumption. In the absence of proper ventilation system it is very difficult for the human being to sustain inside the plant. Even the tripping of many devices may lead to the closure of the unit.

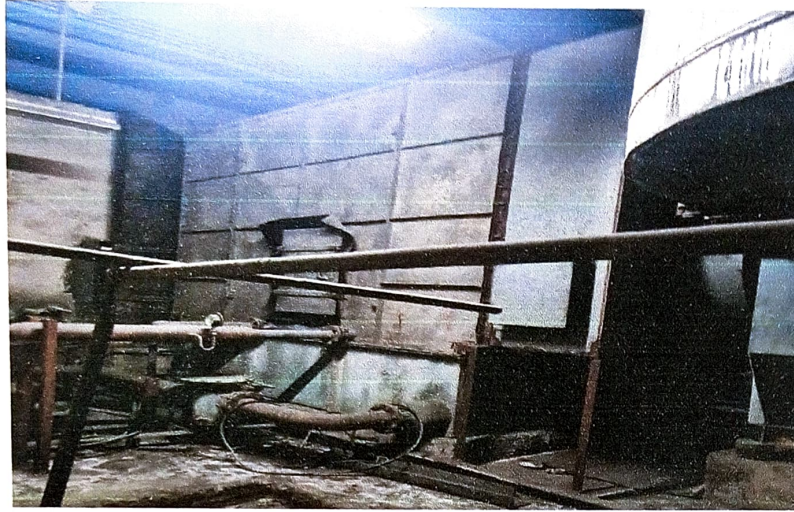


Figure 1.6: Ventilation system of the air washer

Recommendation:

It is therefore recommended that a new air handling system for temperature control is essential and must be commissioned with immediate effect. Total 11 air washers must be newly designed, erected and commissioned as provided in the scheme 1 of DPR 1. This shall lead to improved availability of HT/LT Auxiliaries to improve generation, reductions in operation and maintenance cost of HT/LT switchgear equipment, reduction in breakdowns of instrument and service air compressors, improved availability of 220 VDC batteries, 24 VDC batteries, 415V AC UPS batteries, improved and accurate quality of SWAS LAB samples, reduction in breakdowns of condensate polishing unit operations, Less energy consumption and most importantly, reduction in CO₂ emission.



Scheme 1.2: Upgradation of reciprocating compressor into screw compressor at Unit#6

During inspection of compressor unit at Unit#6 it is noted that total six numbers of M/s Kirloskar make (Model No. T-BTD-RM) air compressors are installed during commissioning of the plant (i.e.-2007) at Parli TPS, U #6. These compressors are installed to ensure supply of uninterrupted Instrument and service air for respective plant for actuation of pneumatic valves, air pre-heaters rotation during emergency/failure of A/H motor, atomizing air for LDO during boiler start up, general utilities like cleaning of spares during maintenance, etc. Compressors are in continuous operation since commissioning of unit. Preventive maintenance of all these compressors is carried out regularly. Due to ageing effect and wear & tear, frequent breakdown is observed for all air compressors. Increased compressor breakdown and daily maintenance minimizes availability of the compressors.

At present, all compressors HP & LP cylinder clearances increased which may result in short circuiting of air within cylinder. It results in an increase of HP- LP suction and delivery temperatures. Also inter cooler and after cooler tubes leakages are increasing day by day. This causes back pressure and increase in element temperature beyond tripping limit. Further due to moisture ingress, it affects the operation of related auxiliaries. Due to overage & 24 X 7 operations, life cycle of these critical parts has been exhausted completely and unpredicted failures are taking place. In order to repair these compressors, work is undertaken for cooling jacket and other piping by acid cleaning frequently.

Figure No. 1.12 is self indicative that the compressor unit is in the critical condition and which is to be replaced with new compressor system as intercoolers and after coolers choked up due to large number of dummy tubes tends to increase temperatures of L.P delivery and H.P suction of compressors. Designed coolers are failing to maintain temperatures under permissible limits.

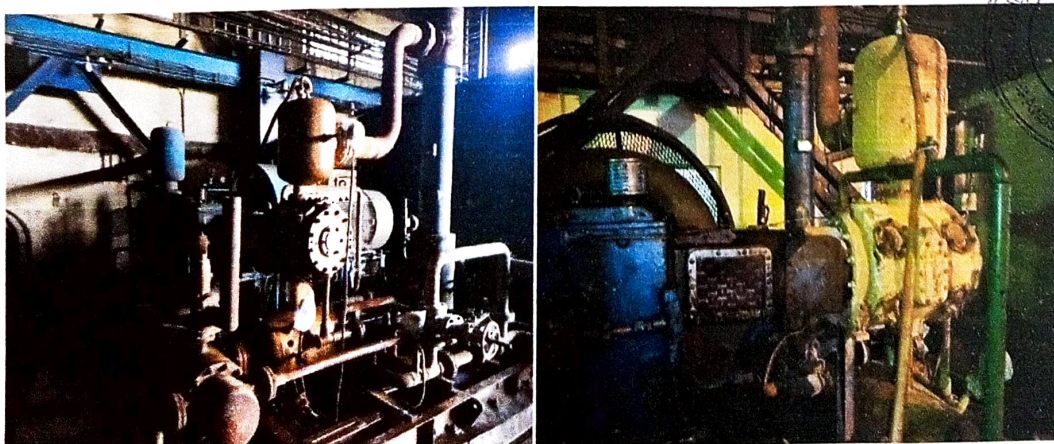


Figure 1.7 External cooling water sprayed over HP cylinder for maintaining of HP discharge temperature.

Some serious facts with respect to the condition of compressor units in the plant are noticed as follows:

1. Instrument air compressor A: More than 20% of tubes of inter cooler are made dummy to avoid leakages. HP cylinder clearances on higher side.
2. Instrument air compressor B – More than 15% of inter cooler tubes and 10% of after cooler tubes are made dummy to avoid leakages. LP and HP cylinder clearances on higher side.
3. Instrument air compressor C – More than 30% of tubes are made dummy to avoid leakages. LP and HP cylinder clearances on higher side.
4. Service Air compressor B – More than 15% of both inter cooler tubes and after cooler tubes are made dummy to avoid leakages. LP and HP cylinder clearances on higher side.
5. Service air compressor - C - More than 15% of inter cooler tubes are made dummy to avoid leakages. LP cylinder clearances on higher side.

Recommendation:

There is always a risk of unit shutdown due to unavailability of compressor. It is learned that that there are many incidents reported in the past of complete unavailability of these compressors leading the unit shutdown condition. At such times opening the interconnecting valve (between U#6 to U#7) and run both units were the only optioned left to with the team. These incidents compelled them to carry the risk of both units tripping and generation loss. Hence, at the time of maintenance there is a need to open interconnecting valve and carry out maintenance under pressure.

So, in order to ensure availability of compressors, it is proposed to replace reciprocating type air compressors with screw air compressors. Screw type compressor offers following advantages over other type of compressors:

1. Due to rotary motion of compressing elements, less friction, noise and vibration.
2. Less numbers of spare will required to be maintained so reduced inventory.
3. The availability of new air compressors may avoid generation loss of unit during any emergency.
4. A new air compressor will be a quality job as compared to replacement of repaired parts and hence it will be a reliable maintenance process.
5. Maintenance required will be less.



Scheme 1.3: Refurbishment of spare HPT Module

Parli TPS unit 6,7 & 8 & Paras TPS Unit 4 & 5 turbines are of identical design. Parli TPS unit 6,7 & 8 TG sets are supplied & commissioned by M/s BHEL in 2007,2010 & 2016 respectively. The Capital overhauling of the Steam turbine is done after every 50000 running hours. During each Capital overhaul the HP, IP and LPT turbine opened for servicing and to check the healthiness of its critical components such as Rotor, blades, seals, Inter-stage seals etc. The Capital overhaul period varies from 40 to 45 days depending upon the condition of the components and its repair work involved. The scheme is to Refurbish Spare HPT Module unit 6,7 & 8 & Paras TPS Unit 4 & 5 which was removed from Unit 6 to have better inter-stage sealing, better efficiency up to designed efficiency and to have improved Turbine heat rate. Also, this refurbished HPT module can be used in unit 6,7 & 8 & Paras TPS Unit 4 & 5 for any emergency that arises due to any failure in running unit or during capital overhauling of unit.

Generation of electricity from steam requires Turbines for the expansion of steam by virtue of which pressure energy of steam is converted into kinetic energy and then kinetic energy is converted into electrical energy by the generator.

At present the spare HPT module at Parli TPS is defective and needs refurbishment. HP turbine was consuming more than 675 tonnes of steam to generate 250 MW. Over the years, the inter stage sealing between stages has been deteriorated resulting in the short circuit of steam flow affecting the turbine output and sealing steam leakages through gland areas. Taking into considerations, its critical nature and importance in the power generation, spare HPT module is to be refurbished. This module is to be undergone various tests like:

- i. Metallography and hardness
- ii. Radial, Axial clearance and Alignments check
- iii. Replacement of rotor & casing sealing strip & its machining.
- iv. Balancing spectrum
- v. Over-speed test
- vi. Rotor lock blade measurement
- vii. Concavity of coupling face
- viii. Run-out test.
- ix. Magnetic Particle inspection
- x. Ovality check
- xi. Blue matching test: HPT inner and outer casings and rotor
- xii. Other visual observations



xiii. Hydraulic test if blue matching not possible

At present the spare HPT module at Parli is defective and needs refurbishment. HP turbine was consuming more than 675 tonnes of steam to generate 250 MW. Over the years, the inter stage sealing between stages has been deteriorated resulting in the short circuit of steam flow affecting the turbine output and sealing steam leakages through gland areas. Taking into considerations, its critical nature and importance in the power generation, spare HPT module is to be refurbished.

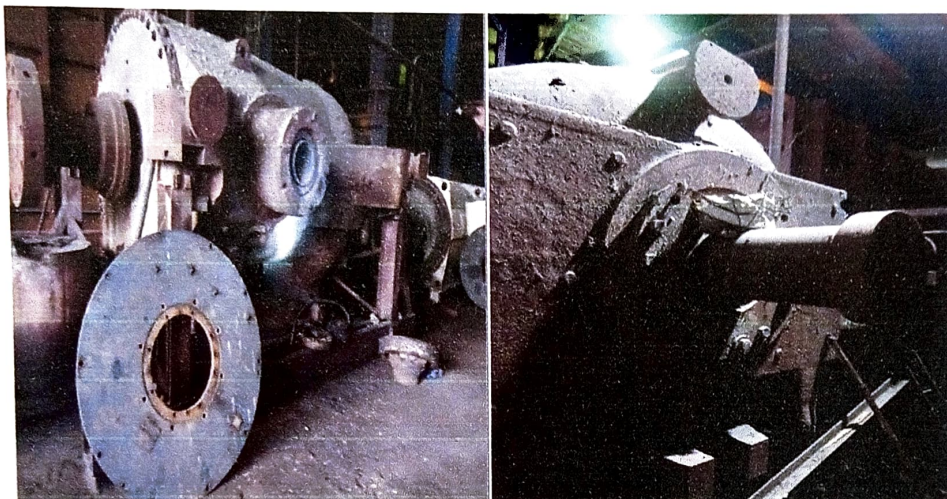


Figure 1.8: Current condition of the spare HPT

After the discussion with the onsite engineers and maintenance team at plant it is learned that current condition of the HPT may result into:

1. Lower in efficiency of HP Turbine.
2. Increase in HPT exhaust temperature and leak-off steam from gland areas.
3. High down time during any failure on account of HPT module.
4. Increase numbers of forced outages.
5. Due to barring jamming, at each tripping unit needs 48 to 72 Hrs. for re rolling.

HP turbine module refurbishment is the only option to cope up with present issues as new HPT module is having higher cost. It will be beneficial to have spare HPT module which can be replaced during COH of the unit and the replaced HPT module will be sent for refurbishment and this refurbished HPT module will be available for the replacement for maintaining the efficiency of HP Turbine and reduced downtime during any emergency arise on account of HP turbine.

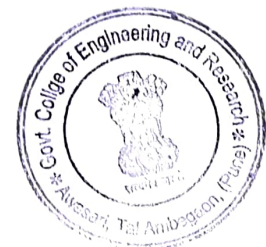


The above benefits are expected to yield improvements in plant level parameters. Apart from above it also studied that the spare HPT module for Unit 6,7 & 8 Parli TPS & Unit 4,5 Paras TPS shall help in:

- a) **Lesser Inventory:** - Complete overhauling of the used old HPT module can be done afterwards & spare parts can be procured after thorough inspection and as per requirement only, which will reduce the inventory cost as well. Also, the refurbished module can be kept ready for the next overhaul of any unit. Even alternate use will result in life extension.
- b) **Protection against unforeseen outage/ breakdown and long revival time:** - As the existing units have completed @ 16, 13 & 7 years of operation, there is possibility of unforeseen outage on account of component failure. In such an event the restoration time will be high in absence of spare module and very long lead time of manufacturing cycle.
- c) **Other issue/ risk:** - Higher unit outage leading to high generation loss, High level of risk associated with HPT module, Instances of failure of HPT module at various power plants in the country / including MSPGCL internal experiences or incidences etc.

Recommendation:

Presently Parli TPS has a spare HPT module that has some problems. These defects can be solved with refurbishment. Thus, the scheme is to refurbish one spare HPT module with us so that during the capital overhaul of the units 6 & 7 and Paras unit 4 & 5 (as a common pool) HPT module can directly be replaced and the replaced HPT module can be sent for checking and cleaning of blades and other tests if required so that again in the next coming overhaul of another unit, either Parli U#6, 7 & 8, & Paras U#4,5 the spare HPT module which is reworked can directly be replaced. Hence, it is essential to have a spare HPT module so as to save the additional time required for refurbishment of HPT module and avoid generation loss. Refurbishment of the HPT module will be beneficial to MSPGCL. If spare HPT module is ready at site, as HPT module can be directly replaced, and the overhauling of the HP Turbine can be carried out in spare time and can be utilized for other unit. Considering the above, it is proposed to get the HP module refurbishment from OEM.



Scheme 1.4: Upgradation of existing chiller AC plant of area PCR, Service Building and VFD area at Unit#6 TPS, Parli-V

The expert team also visited the existing chiller AC plant at various locations in Unit#6. Under this scheme, various components and systems such as water cooled chiller, condenser water pump, chilled water pump, PCR air handling unit, service building air handling unit, VFD air handling unit and cooling tower were thoroughly inspected. There are total 3 chiller units at Unit#6 and proper functioning of these is very essential as the risk of unit shutdown is high as VFD room and PCR temperature are currently being maintained near to threshold levels and may ending up damage to critical auxiliaries electronics card and its malfunction/tripping. The important observations about these systems and components and the corresponding recommendations are provided here:

Chillers at Unit#6 works on VCR system and using R22 as a refrigerant and as per Montreal protocol R22 refrigerant need to be phased out. It is observed that chiller unit-1 is out of service due to damaged piston.



Figure 1.9: Damaged chiller assembly

Abnormal noise is observed coming from chiller in service due to higher vibrations in chiller unit-2 and 3. Frequent maintenance of condensate water pump and chilled water pump as these pump are in service since commissioning i.e. since 16 years. Frequent tripping of Condensate water pump and chilled water pump due to motor overload as motor is taking higher current.

PCR AHU filter frame is rusted and damaged due to which air filter fitting on its position is difficult. Air filter gets fallen completely due to damaged frame resulting in impure air entering PCR. All AHU air filter are found damaged. Also AHU structure and air filter frame is damaged resulting in impure air entering in PCR & VFD room.



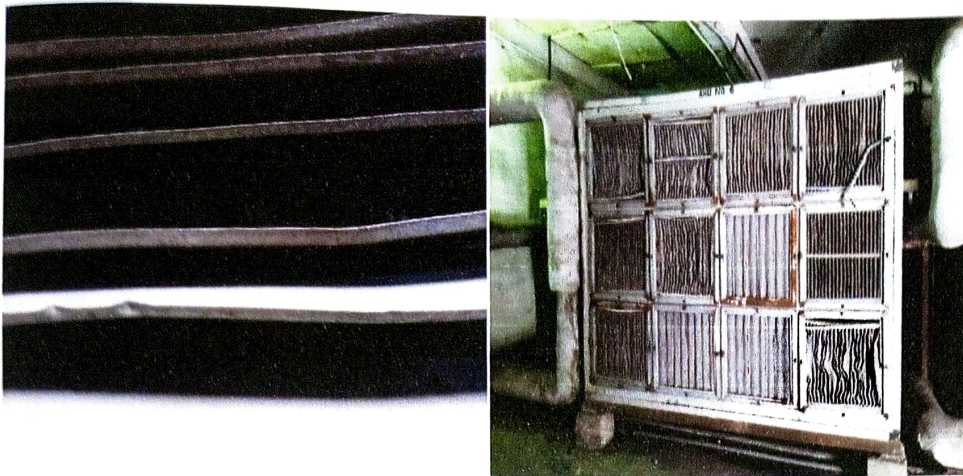


Figure 1.10: Damaged filter and frames of AHU filter

Insulation of chilled water pipeline is damaged due to ageing.

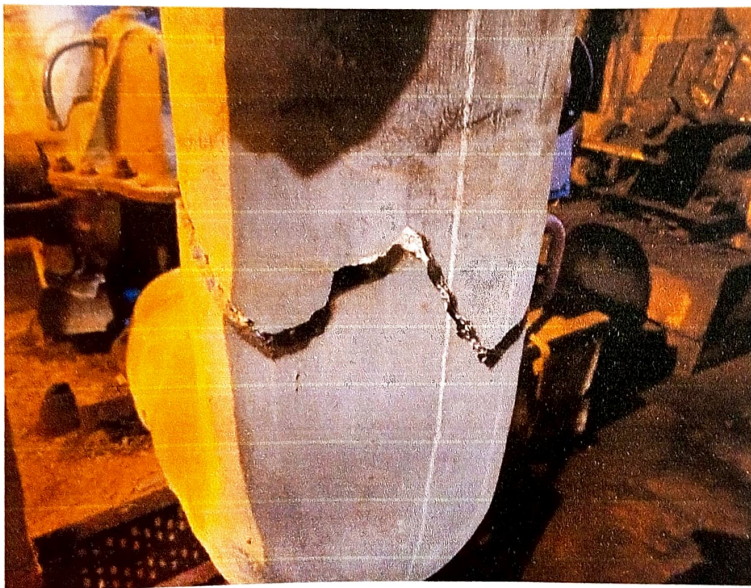
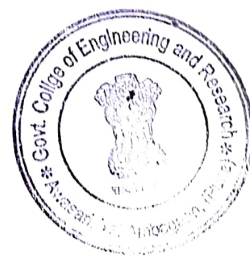


Figure 1.11: Damaged insulation of chilled water pipeline of chiller



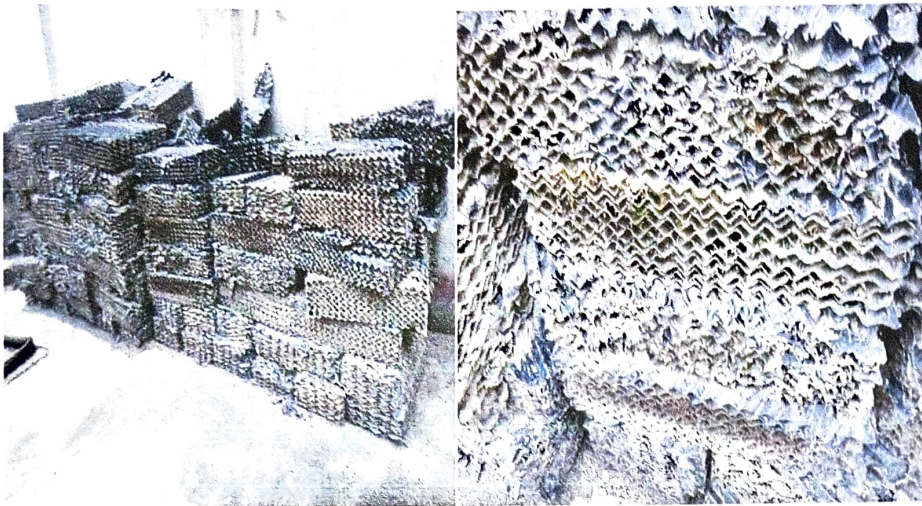


Figure 1.12: Damaged insulation of chilled water pipeline of chiller



Figure 1.13: Damaged structure of AHU

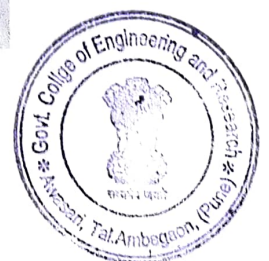


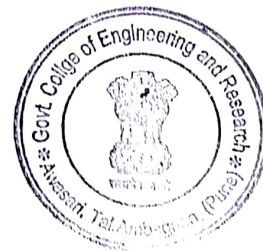


Figure 1.14: Damaged structure of AHU

Risk of unit shutdown as VFD room and PCR temperature are maintaining on higher side resulting in damage to critical auxiliaries electronics card and its malfunction/tripping.

Recommendation:

After the thorough inspection of existing chiller AC plant it observed that all the three chillers are not in condition to deliver the desired supply of cooled air to the designated locations which may lead to trip the entire plant frequently. Therefore it is recommended to upgrade Existing Air Handling unit by replacing with new energy efficient air handling units as soon as possible. The new air compressor will reduce operational and maintenance costs. Replacement of the old compressor with a new one will reduce auxiliary power consumption. Availability of compressors will increase. Improved availability of air compressors will help in avoiding emergency and unit tripping and hence generation and financial losses. Less maintenance resulting in reduced inventory of spares.



5.0 CONCLUSION

Scheme No.1.1 Designing, Erection & Commissioning of Energy Efficient Air Temperature Controlling system at U#6,7:

It is therefore recommended that a new air handling system for temperature control is essential and must be commissioned with immediate effect. Total 11 air washers must be newly designed, erected and commissioned as provided in the scheme 1 of DPR 1. This shall lead to improved availability of HT/LT Auxiliaries to improve generation, reductions in operation and maintenance cost of HT/LT switchgear equipment, reduction in breakdowns of instrument and service air compressors, improved availability of 220 VDC batteries, 24 VDC batteries, 415V AC UPS batteries, improved and accurate quality of SWAS LAB samples, reduction in breakdowns of condensate polishing unit operations, Less energy consumption and most importantly, reduction in CO₂ emission.

Scheme No.1.2: Upgradation of reciprocating compressor into screw compressor at U#6:

There is always a risk of unit shutdown due to unavailability of compressor.

There are many incidents reported in the past of complete unavailability of these compressors leading the unit shutdown condition, At such times opening the interconnecting valve (between U#6 to U#7) and run both units were the only optioned left to with the team. These incidents compelled them to carry the risk of both units tripping and generation loss. Hence, at the time of maintenance there is a need to open interconnecting valve and carry out maintenance under pressure.

So, in order to ensure availability of compressors, it is proposed *to replace reciprocating type air compressors with screw air compressors*. Screw type compressor offers following advantages over other type of compressors:

1. Due to rotary motion of compressing elements, less friction, noise and vibration.
2. Less numbers of spare will required to be maintained so reduced inventory.
3. The availability of new air compressors may avoid generation loss of unit during any emergency.
4. A new air compressor will be a quality job as compared to replacement of repair of parts and hence it will be a reliable maintenance process.
5. Maintenance required will be less.

Scheme No.1.3 Refurbishment of spare HPT Module:

Presently Parli TPS has a spare HPT module that has some problems. These defects can be solved with refurbishment. Thus, the scheme is to refurbish one spare HPT module with us so that during the capital overhaul of the units 6 & 7 and Paras unit 4 & 5 (as a common pool) HPT



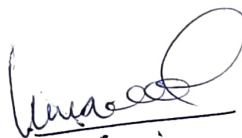
module can directly be replaced and the replaced HPT module can be sent for checking and cleaning of blades and other tests if required so that again in the next coming overhaul of another unit, either Parli U# 6,7 & 8, & Paras U#4, 5 the spare HPT module which is reworked can directly be replaced. Hence, it is essential to have a spare HPT module so as to save the additional time required for refurbishment of HPT module and avoid generation loss. Refurbishment of the HPT module will be beneficial to MSPGCL. If spare HPT module is ready at site, as HPT module can be directly replaced, and the overhauling of the HP Turbine can be carried out in spare time and can be utilized for other unit. *Considering the above, it is proposed to get the HP module refurbishment from OEM.*

Scheme No.1.4 Up gradation of existing chiller AC plant of area PCR, Service Building and VFD area at Unit#6 TPS, Parli-V:

After the thorough inspection of existing chiller AC plant it observed that all the three chillers are not in condition to deliver the desired supply of cooled air to the designated locations which may lead to trip the entire plant frequently. *Therefore it is recommended to upgrade existing air handling unit by replacing with new energy efficient air handling units as soon as possible.* The new air compressor will reduce operational and maintenance costs. Replacement of the old compressor with a new one will reduce auxiliary power consumption. Availability of compressors will increase. Improved availability of air compressors will help in avoiding emergency and unit tripping and hence generation and financial losses. Less maintenance resulting in reduced inventory of spares.



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