



Bangladesh Power Development Board
INTEGRATED MANAGEMENT SYSTEM
(BASED ON ISO 9001:2015, ISO 14001:2015 & ISO
45001:2018 STANDARDS)

PROCEDURE FOR MECHANICAL MAINTENANCE – COAL
POWER PLANT



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Document No.:
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PROCEDURE FOR MECHANICAL MAINTENANCE – COAL POWER PLANT

Effective Date: 01-11-2021

Page 2 of 8

1.0 Purpose

- To establish effective mechanical maintenance system for the plant and machinery for ensuring continuing process capability
- To plan and implement mechanical maintenance

2.0 Scope

Applies to whole of Integrated Management System of Bangladesh Power Development Board (BPDB)

3.0 Terms & Definition

Definition

None

Abbreviations

BPDB – Bangladesh Power Development Board
MR – Management Representative

4.0 Roles and Responsibility

| Tasks in Reference Clause nos. | Responsibility |
|------------------------------------|--|
| 5.0, 5.1 | Head of mechanical maintenance, SDE/AE/SAE |
| 5.2, 5.3, 5.3.1, 5.3.2, 5.3.3, 5.4 | Head mechanical maintenance, SDE/AE/SAE/foreman, |
| 5.5 | Executive engineer, SDE/AE/SAE/ FOREMAN |
| 5.6 | MR/ Head of the plant |

5.0 Procedure

Plan of the Maintenance Procedures

As the maintenance intervals often depend on the operating conditions, the stated intervals are to be considered as guidelines of supplier of the plant. Take note of these guidelines when creating overall maintenance plan for the plant. The maintenance intervals are given as running hours for the device or as calendar based intervals (Hours, Days, weeks, months or years). If none of these are applicable, the best estimation must be applied. The calendar-based intervals are counted as total elapsed time, if not otherwise stated, this interval applies regardless

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INTEGRATED MANAGEMENT SYSTEM

PROCEDURE FOR MECHANICAL MAINTENANCE – COAL POWER PLANT

| |
|----------------------------------|
| Document No.: BPDB-IMS-PR-025 |
| Revision No.: 00 |
| Effective Date: 01-11-2021 |
| Page 3 of 8 |

of the running hours of the device. It is left to the discretion of the maintenance planner to apply the stated interval correctly.

Following 3 types of maintenance is: carried out

- Schedule maintenance
- Breakdown Maintenance
- Preventive maintenance

5.1 Schedule Maintenance

- Seek permission from operation department on schedule issue
- Operation gives permit after isolation
- Respective maintenance is done as per procedure following the Operation and maintenance manual
- Planned Maintenance of equipment includes
 - Routine check
 - Test and Adjustment of equipment
 - Elimination equipment defects
 - Correction of Malfunction of equipment in operation or in backup state

5.2 Breakdown Maintenance

On-Load

Off-Load

- Concerned operation unit report breakdown or abnormality
- Job allocated to concerned official
- Concerned technician/ official/ engineer check the facility and assess the maintenance task
- Maintenance task is approved
- If the maintenance can be done on- load, then it is carried out
- If the maintenance of repair requires to be carried out off load, permission of the concerned authority is taken
- Maintenance work is carried out" accordingly
- On completion of Maintenance work, required checking is carried out.
- Maintenance work is recorded

5.3 Maintenance grades

Maintenance grades refer to TBM of generating unit. The TBM of generating unit is classified into 4 types: A, B, C and D. The principle of classification is based on the downtime of the unit.

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INTEGRATED MANAGEMENT SYSTEM

Document No.:
BPDB-IMS-PR-025

Revision No.: 00

PROCEDURE FOR MECHANICAL MAINTENANCE – COAL POWER PLANT

Effective Date: 01-11-2021

Page 4 of 8

5.3.1 Class A Maintenance:

A planned, thorough & comprehensive examination and repair of the-unit through dismantling so as- to maintain restore or upgrade its performance

5.3.2 Class B Maintenance

In view of existing problems: of some equipment of the unit, examinations and repair are carried out through dismantling of the equipment. 'The downtime for class B maintenance is about one half of that of class A. In the process of class B maintenance, some items of class A maintenance may be undertaken in the light of appraisal of conditions of the unit

5.3.3 Class C Maintenance

Examination, appraisal, repair and cleaning of the unit are carried out with an emphasis according to the rule of wear and aging of equipment Defects elimination, replacement of a few parts, adjustment of equipment preventive testing and part of items of class A maintenance may be undertaken

Class D Maintenance:

Defects elimination of auxiliary system and equipment is carried out when some defects of equipment exist while the operation of the unit as whole is good. The downtime for class D maintenance is about one half of that of class C maintenance. Besides the defects elimination of I auxiliary system and equipment, some items of Class C maintenance may be undertaken in the light of appraisal of conditions of Equipment

5.4 Interval of Time Based Maintenance and Combination of Grades

- Class A maintenance is carried out for the first time one year after commissioning of a new generating unit
- Thereafter carry out class A maintenance once every 4 to 6 years
- In the year without class A maintenance carry out other grade of TBM once every year
- If class A maintenance is carried out once every 4 years/the following Combination is recommended:

A -* C --> C --> C --> A.

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INTEGRATED MANAGEMENT SYSTEM

Document No.:
BPDB-IMS-PR-025

Revision No.: 00

PROCEDURE FOR MECHANICAL MAINTENANCE – COAL POWER PLANT

Effective Date: 01-11-2021

Page 5 of 8

- If class A maintenance is carried out once every 6 years, the following Combination is recommended:
A -> C -> C ^ B - * C -> C -+ A
- class 6 maintenance, class D maintenance May be increased once every year, or class C maintenance may be replaced by class P maintenance once

5.5 Preventive Maintenance

- Prepare long term (2-6 years) Equipment preventive maintenance plan for manual Feed pump.
- Concern authority approves preventive maintenance plan
- Resources and spares are mobilized to carryout preventive maintenance
- Plant shutdown is solicited as required
- Maintenance works are performed accordingly
- Necessary checks are performed" after maintenance work

5.6 Implementation & Review

- Procedure for Maintenance and its effectiveness after implementation will be checked and reviewed during internal audits.
- Actions are taken on the basis of review.

5.7 Environmental Aspect, Impact & Controls

Any activity at the plant, whether it is carried out for ensuring quality of service or meeting requirement of the interested parties, there will be some environmental aspects associated with it. It is a requirement of the IMS of BPDB to identify those environmental aspects, evaluate their impact and determine necessary controls.

While carrying out the activities and operation, the employees of BPDB need to exercise appropriate and predetermined controls so as to prevent or mitigate any adverse impact that may be associated with the activity or the process.

Some examples of environmental aspects associated with the procedure for mechanical maintenance - coal power plant are as below:

| SI Nos. | Aspect | Impact | Controls |
|---------|--|----------------|-------------------------------------|
| 1. | Disposal of Metal / Plastics parts, which are not recycled | Soil pollution | 1. Follow the waste management plan |
| 2. | Oil / Lubricants | Soil pollution | 1. Work and dispose as per |

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PROCEDURE FOR MECHANICAL MAINTENANCE – COAL POWER PLANT

Document No.:
BPDB-IMS-PR-025

Revision No.: 00

Effective Date: 01-11-2021

Page 6 of 8

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|----|---|------------------------|--|
| | disposal | | the chemical disposal plan |
| 3. | Usage of Chemical during overhaul | Soil / Water Pollution | 1. Work and dispose as per the chemical disposal plan 2. Provide Necessary Training |
| 4. | Oil filled clothes(Jute) | Soil pollution | 1. Follow the waste management plan |
| 5. | Oil Spill | Soil pollution | 1. Work and dispose as per the chemical disposal plan |
| 6. | Water for cleaning | Water Pollution | 1. Discharge as per 'Effluent water Quality' guidelines |
| 7. | Electrode disposal | Soil pollution | 1. Follow the waste management plan |
| 8. | Carbon Powder - Soil Pollution | Soil pollution | 1. Follow the waste management plan |
| 9. | Water bearing chemical discharged from radiator | Soil / Water Pollution | 1. Discharge as per 'Effluent water Quality' guidelines |

The table above provides examples only. The IMS team of each site needs to identify the aspect impact and controls related to specific activities and ensures that the environmental performance of the organization is effectively maintained. For this purpose, the procedure “Environmental Aspect Impact Assessment Procedure” is to be followed and forms “Environmental Aspect Impact Register” is to be filled up by the IMS team.

5.3 OHS Hazard, Risk & Controls

Any activity at the plant, whether it is carried out for ensuring quality of service or meeting requirement of the interested parties, there will be some occupational hazards with it related to the occupational health and safety (OHS) to the workers and employees. It is a requirement of the IMS of BPDB to identify those OHS hazards and determine necessary controls.

While carrying out the activities and operation, the employees of BPDB need to exercise appropriate and predetermined controls so as to prevent or mitigate any adverse consequence that may be associated with the activity or the process.

Some examples of OHS hazards and with the procedure for mechanical maintenance - coal power plant are as below:

| SI Nos. | OHS Hazard | Controls |
|---------|------------------------------|-------------------------------|
| 1. | Burn from steam pipe leakage | 1. Provide Necessary Training |
| 2. | Failure of PTW Process | 1. Provide Necessary Training |

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PROCEDURE FOR MECHANICAL MAINTENANCE – COAL POWER PLANT

Effective Date: 01-11-2021

Page 7 of 8

| | | |
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| | | 2. Active Supervision of activity |
| 3. | Wrong Use of tools | 1. Provide Necessary Training 2. Active Supervision of activity |
| 4. | Wrong use of Lifting equipment | 1. Provide Necessary Training 2. Active Supervision of activity. 3. Maintain adequate PPE whilst at worksite |
| 5. | Dropped object | 1. Provide Necessary Training 2. Maintain adequate PPE whilst at worksite |
| 6. | Fall | 1. Provide Necessary Training 2. Maintain adequate PPE whilst at worksite |
| 7. | Expose to Chemicals | 1. Provide Necessary Training 2. Maintain adequate PPE whilst at worksite |
| 8. | Entrapment | 1. Provide Necessary Training 2. Active Supervision of activity. 3. Maintain adequate PPE whilst at worksite |
| 9. | Cold Burn | 1. Provide Necessary Training 2. Maintain adequate PPE whilst at worksite |
| 10. | Chemical Burn | 1. Provide Necessary Training 2. Maintain adequate PPE whilst at worksite 3. Maintain adequate housekeeping |
| 11. | Manual Handling | 1. Provide Necessary Training |
| 12. | Electric Shock | 1. Ensure a Permit to Work is issued as per guidance before personnel is sent for work 2. Maintain LOTO Procedure 3. Maintain adequate PPE whilst at worksite |
| 13. | Wrong Startup | 1. Alarm 2. Ensure a Permit to Work is issued as per guidance before personnel is sent for work |
| 14. | Improper re-assembly of equipment | 1. Provide Necessary Training 2. Active Supervision of activity |
| 15. | Noise | 1. Staff must wear Earmuff whilst at worksite |
| 16. | Heat Stress | 1. Provide Necessary training 2. Schedule proper work plan |

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Document No.:
BPDB-IMS-PR-025

Revision No.: 00

Effective Date: 01-11-2021

Page 8 of 8

The table above provides examples only. The IMS team of each site needs to identify the OHS hazards and necessary controls related to specific activities and ensures that the environmental performance of the organization is effectively maintained. For this, the procedure Hazard Identification and Risk Assessment Procedure is to be followed and Hazard Identification and Risk Assessment Register is to be filled up by the IMS team.

6.0 References

- a) Operation and maintenance manual
- b) Equipment manual
- c) Audit Report

7.0 Appendix

None

8.0 Revision History

| SI No. | Revision Number | Section | Change Made | Date of Revision |
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