Jhajjar Project Management …An Insight

March 4, 2013
2 x 660 MW
Mahatma Gandhi Thermal Power Plant
Jhajjar, Haryana, INDIA
A Brief Introduction

• 2x 660 MW greenfield project, named as “Mahatma Gandhi Thermal Power Plant” built by Jhajjar Power Limited (JPL)

• The Plant is located in Jhajjar district of Haryana
• The Project awarded by Government on 23rd July, 2008 with target completion date of 22nd July 2012
• The Plant started commercial operation on 19th July, 2012 i.e. 3 days ahead of the schedule
Preparations for the journey….

• Entire Main Plant contract awarded on turnkey basis to SEPCO-III/ TIEJUN after extensive deliberation & evaluation

• CLP Engineering team identified & included the list of reputed Chinese vendors for critical equipment in the Owner’s Technical Requirement (OTR)

• Basic Engineering finalized by CLP Engineering team with inputs from the other CLP Assets

• The specifications of critical equipment like Turbine, Boiler, Generator, Transformer etc. were reviewed by CLP Engineering team

• Site team involved in the review of construction drawings to ensure compliance to Indian Standards and ensure constructability & Plant operability & maintainability
Major Contracts Structure

2 X 660 MW COAL FIRED POWER PLANT

- MAIN POWER HOUSE
  - DESIGN, ERECTION, ENGINEERING & COMMISSIONING BY M/S SEPCO-III
  - RAILWAY SIDING BY M/S GDCL
- INFRASTRUCTURE WORK (JPL)
  - INTAKE WATER SYSTEM BY M/S FLOWMORE, M/S SIMPLEX & M/S GRPAHITE INDIA
  - ASH DYKE BY M/S SUBHASH INFRA ENGINEERS
  - TOWNSHIP, SITE BOUNDARY WALL BY M/S BHAYANA, AAKAR BUILDERS

& EQUIPMENT SUPPLY BY M/S TIEJUN
Staffing Model for Project Execution

- Integrated Project Execution Team comprised of mainly new recruits from various organizations with diversified work culture
- Maintenance staff recruited as construction team ensuring continuity & ownership
- Operational staff recruited well in advance for familiarization, training and active participation in the commissioning activities
JPL SAFETY MISSION

Everyone goes home safely to the family
JPL follows “SAFETY FIRST” Philosophy

Measures taken in line with the CLP safety objective of “Zero Incident”

• Direct employee involvement in Safety Issues (Project Sun Flower)
  • Animated safety induction program
  • Safety Task Forces for high risk activities
  • Improving & spreading safety awareness at site
• Providing EHS related amenities (e.g. Drinking water, sanitation etc.) in the labor camps. Weekly environmental audits to ensure desired standards
  • Regular On-site Tool Box Talks (TBTs)
• Co-operation from main & sub-contractors on safety

• Round the clock availability of medical facilities including doctor, nurse, paramedics, ambulance etc.

• Class room and on-job safety training for staff and contractors’ employees

  • Management safety walk downs twice a week

• Reward and recognition on safety performance to Contractors
Salient technical features

• Super -Critical technology
• Mini Oil Ignition technology to reduce oil consumption
• Flue Gas Desulphurization (FGD) for reduction of SOx emission
• Combination of ESP & fabric filter to reduce particulate emission
  • Chimney flue duct with Titanium lining to prevent corrosion
• Polymeric insulated SF6 filled current transformer (CT) to reduce the explosion risk level
• Use of bolted joints instead of welded joints in major structures for reduction in construction time & cost.
Project Uniqueness

• Compact Main Plant & CHP layout
Project Uniqueness

• Zero discharge philosophy

• 100% dry ash utilization to reduce environmental impacts & ash storage area requirement

• De-aerator level reduced by locating the BFP Booster Pumps at Ground Floor to decrease the turbine building height
Project Uniqueness

- Use of bolted connections for Boiler, TG and Switchyard Structures to reduce construction time & cost.
Project Uniqueness

• Use of deck sheets for safer & faster concreting for reduction in construction time
Project Uniqueness

- Chimney flue duct with Titanium lining to prevent corrosion of flue duct during FGD operation
Innovations during Project Execution

• Use of Tower Cranes for faster & safer erection & Gantry cranes for extensive pre-fabrication
Innovations during Project Execution

• Deep excavated foundations to substitute time & cost intensive pile foundations
Innovations during Project Execution

- Use of GRP & HDPE pipes in underground water piping system to reduce capital & maintenance cost and installation time.
Innovations during Project Execution

• Steam blowing was done on coal firing instead of the usual practice of doing it on oil firing.

• No water storage facility (overhead tank) throughout the plant by designing round-the-clock running water supply system.

• Use of Extranet for review of engineering drawings during construction to win over geographical constraint.

• The thermal insulation of ESP, Main Steam Piping, Ducts etc. except Boiler was started before the boiler hydro test to mitigate the delay in the boiler erection.
Best Practices during Project Execution

In addition to following the CLP standard procedures, manuals & guidelines

• Development of Project Execution Plan & Procedures e.g.
  • Contract Management Procedure
  • Invoice Processing Procedure
  • Budget Control & Monitoring Procedure
  • Departmental Construction & Commissioning Procedures

• Review & approval of Shop Inspection & Test Plan (ITP) for all critical equipment including owner’s “hold points”

• Third party inspection & internal inspection by CLP at manufacturer’s facility
  • Review & approval of Field Quality Plans (FQP)
Challenges overcome

SAFETY

• Difference in safety approach between CLP, TIEJUN/ Sub Contractors

• High turnover of workmen who are mostly from villages, unskilled and illiterate

  • Prevailing fatalistic attitude amongst workers

• Lack of support from Contractor / Sub Contractors site management on safety issues
Challenges overcome

• Language barrier between SEPCO III/ TIEJUN and JPL

• Timely supply of offshore materials & equipments

• Land related issues for installation of raw water pipeline and railway line through the villages

• Daily commute of approx. 150 km by the project personnel during the construction phase
## Project Execution Milestones

<table>
<thead>
<tr>
<th>MILESTONE</th>
<th>DATE</th>
<th>TIME (Days) w.r.t. NTP</th>
</tr>
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<tbody>
<tr>
<td>NOTICE TO PROCEED (NTP)</td>
<td>23-Mar-09</td>
<td>0</td>
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<tr>
<td>FIRST CONCRETE MAIN POWERHOUSE</td>
<td>16-May-09</td>
<td>54</td>
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<tr>
<td>START OF ERECTION OF BOILER STEEL STRUCTURE</td>
<td>1-Nov-09</td>
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<td>COMPLETION OF ERECTION OF BOILER STEEL STRUCTURE</td>
<td>6-Sep-10</td>
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<tr>
<td>TG BED PLATE POSITIONING (START)</td>
<td>15-Nov-10</td>
<td>602</td>
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<tr>
<td>DCS CHARGING</td>
<td>17-Mar-11</td>
<td>724</td>
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<tr>
<td>CHIMNEY OUTER SHELL COMPLETION</td>
<td>18-Apr-11</td>
<td>756</td>
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<tr>
<td>GENERATOR STATOR POSITIONING</td>
<td>24-May-11</td>
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<tr>
<td>START UP POWER (BACK ENERGISATION)</td>
<td>2-Jun-11</td>
<td>801</td>
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<tr>
<td>COMPLETION OF BOILER HEATING SURFACE ERECTION</td>
<td>28-Jun-11</td>
<td>827</td>
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<tr>
<td>BOILER HYDRO TEST COMPLETION</td>
<td>18-Aug-11</td>
<td>878 (29 months)</td>
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<td>MILESTONE</td>
<td>DATE</td>
<td>TIME (Days) w.r.t. NTP</td>
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<td>TG BOX-UP</td>
<td>20-Aug-11</td>
<td>880</td>
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<tr>
<td>DM WATER GENERATION</td>
<td>27-Aug-11</td>
<td>887</td>
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<td>COMPLETION OF CHEMICAL CLEANING OF BOILER</td>
<td>20-Nov-11</td>
<td>972</td>
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<td>COMPLETION OF TG OIL FLUSHING</td>
<td>23-Nov-11</td>
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<td>COMPLETION OF BOILER INSULATION WORKS (only to support steam blowing)</td>
<td>30-Nov-11</td>
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<td>BOILER LIGHT UP</td>
<td>7-Dec-11</td>
<td>989 (33 months)</td>
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<td>START OF STEAM BLOWING (on Coal firing)</td>
<td>8-Dec-11</td>
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<td>COMPLETION OF STEAM BLOWING</td>
<td>19-Dec-11</td>
<td>1001 (33.4 months)</td>
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<td>SYCHRONIZATION &amp; TRIAL OPERATION</td>
<td>11-Jan-12</td>
<td>1024 (34 months)</td>
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<td>ACHIEVE FULL LOAD</td>
<td>12-Jan-12</td>
<td>1025 (34 months)</td>
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<td>COD AS PER PPA</td>
<td>22-Jan-12</td>
<td>1035 (34.5 months)</td>
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<tr>
<td>COD</td>
<td>29-Mar-12</td>
<td>1102 (36.7 months)</td>
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Achievements

- Project completed within schedule and budget
- Achieved synchronization of 1st Unit within 34 months of the Notice to Proceed (NTP)
- Achieved Unit full load within 27 hours of first synchronization
Awards & Recognitions

• ECB financing for the Project received the prestigious “Indian Deal of the Year 2010” award from “Project Finance International”

• “Indian Power Deal of the Year 2010” award from “Euromoney”

• CNBC TV18’s Infrastructure Excellence Award for the Year 2012 (Energy & Power Category)
The Journey continues......