

PLANT COMMISSIONING

When done systematically and in coordination with the plant process, the commissioning process of a plant results in a fully functional and lucrative operation

This article describes elemental pre-commissioning and commissioning activities for achieving the delivery of a quality project and the smooth start-up of a new plant.

The Commissioning Team must verify proper erection and oversee testing of each piece of equipment according to equipment manual and specifications, and check-out procedures developed for the project. Incomplete checks will result in frequent stoppages and will eventually lead to poor plant availability, delayed commissioning, and over run of the project cost.

For example, unflushed compressed air lines might cause failures of pneumatically operated instruments and equipment. Likewise, unflushed cooling water lines could adversely affect the equipment and the cooling water system.

The role of commissioning involves:

- A. Structuring the commissioning teams
- B. Pre-commissioning activities
- C. Commissioning and performance testing

A. Team Structuring

The following teams are responsible for working together in order to achieve a safe, smooth and trouble-free start-up. Schedules need to be programmed to allow for a 24/7 uninterrupted operation.

1. OEM's team

Plant management should have a team of Original Equipment Manufacturers' (OEM) commissioning engineers ready at the plant prior to no-load tests to ensure that sequential interlocking, and all safety instruments and control systems are in place.

2. Owner's Erection and Commissioning Team

The Owner's team should be composed of the plant's experienced Process, Mechanical, Electrical / Instrumentation engineers as well as Central Control Room operators.

The Owner's team should be supported by Senior Consultants from the Consulting Firm supporting the commissioning and start-up of the plant.

B. Pre commissioning activities

- 1. Analyses of raw materials and fuel

2. Procurement of critical commissioning spares
3. Ensure availability of all documentation on equipment and systems
4. Mechanical and Electrical check-out according to procedures
5. Construction punch list completion
6. Cleaning of utility lines
7. Complete preliminary check
8. Testing of Electrical and Instrument controls
9. Verification of "Site Start & Stop" and "CCR Start & Stop"
10. Calibration and operation of dampers and control valves
11. Calibration of weighing equipment
12. Group trials of equipment
13. Procurement of Portable Measuring Instruments. (Process parameters measuring Instruments)
14. Ensuring the laboratory test equipment is operational

Equipment trial runs should be done continuously for a few hours; the equipment is then inspected and corrected, if required.

C. Commissioning and Performance Testing

General Steps involved in commissioning:

1. Ensure good health of motors and electrical devices
2. Group sequence starts for each process area
3. Follow the correct heating cycle for the pyroprocessing equipment
4. Plant Start-up on load
5. Plant operation under guidance from OEM's Commissioning Engineers.
6. Tune PIDs and control loops
7. Record of process parameters in log sheets
8. Manage stoppage and re-starts of each processing areas
9. Review and understand the following documents with respect to system, product quality and performance guarantee:
 - i) Suppliers' Instruction Manuals;
 - ii) Equipment Specification List;
 - iii) Flow Sheets;
 - iv) Raw Material Analysis;
 - v) Instrumentation ranges;
 - vi) Instrumentation Alarm / Recorder / Controller scheme;
 - vii) Start – Stop – Operation – Safety Interlock logics;
 - viii) Process Parameters to be maintained for optimum operation;
 - ix) Refractory Drying schedule (from refractory supplier).
10. The joint review by the OEMs', Owner's, and Consultant's teams also includes commissioning protocols, sequences, control scheme and interlocks.

Commissioning and performance testing

After the erection team clears the equipment and no – load trials with a certificate of completion, the Commissioning team will take over the plant for commissioning. Commissioning is a controlled activity well-coordinated with the mechanical, electrical and quality control (laboratory) teams. All the guaranteed parameters are measured during the same commissioning trial. Energy consumption is measured at rated production levels according to the agreed test procedures with the OEMs.

Commissioning and performance testing establishes if the plant meets the production guaranteed values. It also serves as a release of the OEMs' obligations with respect to meeting their guarantees. The plant is handed over to the production team to start operations once a Commissioning and Performance Certificate is issued.

This article was contributed by Jagrut Upadhyay, Process Engineer.