Non Implemented Case Study– Energy Conservation Measure

Measure
Steam Trap Management
Equipment
Steam System
Industry / Sector
Pharmaceutical
Year of Implementation
Implemented 1997 but no follow up is made after wards
Cost Benefit Analysis
◊ Type of Measure: Short term measure
◊ Annual Energy Savings: 29 KL of HSD
◊ Total cost savings: Rs.4.06 lakh
◊ **Recurring expenditure: Rs. 1.00 lakh**
◊ Net cost savings: Rs. 3.06 lakh
◊ Payback: Immediate
Implementation Highlights
⇨ Plant has implemented the measure immediately after the suggestion, but failed to continue the periodic follow up. ⇨ During the re-audit of the plant after two years, steam trap survey indicated that the traps condition is equally bad when compared to the period of first audit. This is due to lack of continuos monitoring and rectification. ⇨ The major causes for the non-implementation are: ⇨ Though the malfunctioning and not working traps were replaced initially, the task of assigning responsibility of steam trap management for sustainability was not done. ⇨ No allotment of budget for steam trap management under the house keeping or maintenance or energy conservation budget. ⇨ No strategic planning for periodic steam trap survey for identification of failures.

Summary

Proper maintenance of steam traps results in reduction steam losses through the traps. In addition it will ensure the distribution network free of condensation, water hammer and improves the heat transfer rate at users.

Background

The steam lines in the plant have 30 nos. of steam traps on distribution side and 16 traps to the equipment.

During the energy audit, a detailed survey was carried out in the steam lines to identify the malfunctioning and not working steam traps. The following table gives the analysis of the steam trap survey.

The audit team had suggested replacing the traps, which are not working/ passing steam. It was also suggested to monitor the working condition of all the steam traps and replace/repair the faulty traps as a regular maintenance practice, at least once in 3 months.

A recurring expenditure is expected towards spares, manpower and contractor charges since the plant may not be able to divert its manpower whenever fault is developed. The task cab be given to the external contractor.

Techno-economics

Particulars	At Steam Distribution lines	At Equipment
Number of traps provided	30	16
Number of traps not working	6	5
Number of traps passing steam	7	-

Particulars	Units	Savings achieved
Steam savings	kg/h	60
Heat savings	kcal/h	40400
HSD savings	lph	4.04
Annual fuel savings @ 7200h	kL	29
Annual cost savings	Rs.lakhs	4.06
Recurring expenditure	Rs.lakhs	1.00
Net cost savings	Rs. Lakh	3.06
Payback period	years	Immediate

Post audit was carried out in the same plant after two years. During the post audit, the steam trap survey indicated that the trap management is poor and more than 15 traps are either malfunctioning or not working. This is because no proper strategy was drawn and maintained.

Principle

Steam traps plays a vital role in steam distribution network and steam using network. Traps removes condensate formed within steam lines which is most essential to avoid the water hammer in the line and in case of process equipment remove the condensate to have better and quicker heating by latent heat in the steam.

- Design suitable stem trap management and follow up action plans which include
  - Designate the responsibility at higher level and operating levels
  - Periodic steam trap surveys (once in three months)
  - Design of formats and procedures for effective control
  - Assign the task of replacement or rectification to dedicated personnel (internal or external)
- Every operating area should have a program to routinely check steam traps for proper operation. Testing frequency depends up on the local experiences but should be at least once in three months.
- All traps should be numbered and locations mapped for easier testing and recording keeping. Trap supply and return lines should be note to simplify isolation and repair.
- Maintenance and operational personnel should be adequately trained in trap testing techniques. Where ultrasonic test is needed, specially trained personnel should be used.
- High maintenance priority should be given to the repair or maintenance of failed traps. Attention of such timely maintenance procedure can reduce failures to three to five percent. A fully failed open trap mean steam losses of 22-45 kg/h.
- All traps in closed systems should have atmospheric vents so that trap operation can be visibly checked.
- Proper trap design should be selected for each specific application. Traps should be properly sized for expected condensate load.