

Case Study: **Flash Steam Recovery**

SENERGY Consultants (P) Ltd

Background:

While studying steam traps and condensate recovery system of a petrochemical industry; it was observed that only condensate was recovered, however the flash steam was vented out in to atmosphere.

Operating Scenario:

The steam was generated at 15 kg/cm²; while the actual usage was at 10 to 12 kg/cm². The major steam consumers included distillation columns and evaporators.

The condensate from various traps was collected in a common collection tank located near the plant. The tank was maintained at atmospheric pressure and condensate was pumped with a help of centrifugal pump. However, the flash steam was observed to be blowing off through the vent all through out the operating period.

The heat transfer in any equipment is only through latent heat and consequently the condensate is formed at same temperature and pressure as that of inlet steam. Thus condensate temperature and pressure at the trap inlet is same as that of steam; while the pressure drops to atmospheric at the trap outlet. This reduces the boiling point to about 100 °C; the drop in enthalpy contents leads to partial evaporation of condensate known as flashing. The vapours so formed are called as flash steam.

The heat carried away by flash steam as well as the quantity depends on the condensate pressure & temperature before the traps. In this particular case; the quantity of flash steam works out to 15.9% of condensate. This would result in energy loss of 55.1% of condensate energy.

Energy Conservation Measures:

The above concerns and issues were addressed in two steps.

- Installing a flash steam vessel & collecting all the condensate in this vessel so as to generate low pressure flash steam at 2.5 kg/cm². The low pressure steam was fed to the existing low pressure header with auto-control system and utilized as low pressure steam.
- Installing flash steam condenser on the existing condensate tank to preheat boiler make up water by condensing the flash steam and utilizing the heat energy.

Outcome:

- The overall saving of 10.0% was realized in the fuel consumption of the boiler.

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3, Aastha II, Opposite Lakme Ltd, B K S Devashi Road, Govandi East, Mumbai 400 088, India.
Phone: ++91 22 2555 3297

Email: senergy@vsnl.com

Website: <http://www.senergy-india.com>