Steam System Course Description

Steam is central to the operation of many industrial facilities. Typically, steam systems comprise one of the largest operating costs associated with an industrial plant. This course will cover the operation of steam systems and will discuss methods of system efficiency improvement. The course presentation follows the outline of the Steam System Survey Guide. This is a guidebook provided to course participants, which describes steam system assessment and management techniques. The course is divided into three major categories:

- Steam Generation Efficiency
- Resource Utilization Effectiveness
- Steam Distribution System Management

The following is a general description of the course content:

In the Steam Generation Efficiency category of the course, the boiler is investigated and the target is obtaining optimum steam generation efficiency. The concept of efficiency is thoroughly investigated and the factors affecting efficiency are identified. Typically, the major avenue of loss associated with boiler operation is energy carried from the system with the flue gas exiting the boiler. Flue gas heat recovery and excess air control are major components associated with this loss. These areas will be covered in the course as well as other areas of efficiency impact such as blowdown, water quality, and boiler shell integrity.

Resource Utilization Effectiveness is a broad category encompassing fuel selection, combined heat and power systems, steam system balancing, and steam end users. These investigation areas can have significant impact on the economics of a facility. Facilities capable of utilizing multiple fuels can realize significant savings as a result of fuel price differences. Combining generation of a site's thermal demand with the electrical demand can result in major improvements in overall cost effectiveness. The course covers the basic concepts of steam turbine operation and the economic impacts of supplying steam exported from turbines.

Steam Distribution System Management is a major challenge in many systems. Identifying and reducing the sources of loss in a system will be discussed. Several focus areas are incorporated in this category, including:

- Steam Leaks
    - Pipe Failures
    - Steam Trap Failures
- Heat Transfer loss through insulation
- Condensate loss
    - Condensate Worth
    - Recovery system considerations

These areas are fundamental in the field of energy management and generally result in attractive economics when savings opportunities are identified. For each of these categories, the presentation goes into the details of the equipment and the theory of operation. The measurements required for appropriate management of each area will be identified. The economic impact for each area will be identified. Many case studies will be presented from steam system surveys conducted by the instructor.