MEBS6000 Utility Services

http://ibse.hk/MEBS6000/

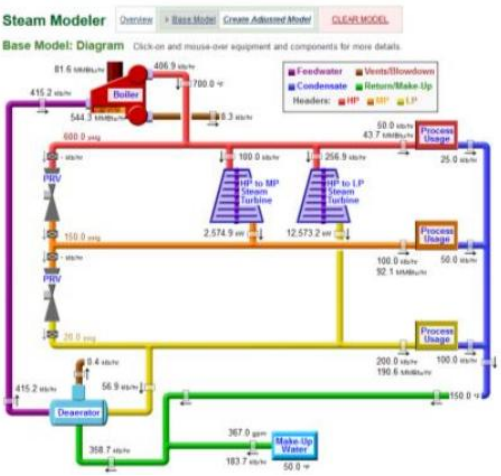
Assignment 02 – Steam System Modeler Tool (SSMT)

This assignment is intended to strengthen what you have learned during the lectures, by conducting hands-on exercises and developing practical experience with the calculations and analysis process. In order to develop the skills for steam system calculations, one software tool has been selected for the learning process.

Steam System Modeler Tool (SSMT)

http://www4.eere.energy.gov/manufacturing/tech_deployment/amo_steam_tool/

The Steam Calculators and Modeler were developed by Michael B. Muller for the U.S. Department of Energy and Oak Ridge National Labs. They provide a variety of steam related calculations and models with comprehensive calculation descriptions and details.



There is often flexibility in the operational conditions and requirements of any steam system. In order to optimize performance, the impacts of potential adjustments need to be understood individually and collectively. This tool allows you to input the metrics of your system, generate a list of detailed system specific steam properties, and test a variety of adjustments on individual equipment.

The Steam System Modeler allows you to create up to a 3-pressure-header basic model of your current steam system. A second model can then be created by adjusting a series of characteristics simulating technical or input changes. This allows you to see how each component and adjustment impacts the others and what changes may be most beneficial to increasing the overall efficiency and stability of the system. An interactive diagram is provided for each model and includes comprehensive steam properties and operational details for clarity and ease of use.

Objective: To learn and appreciate the technique of steam system calculations and modeling using the Steam System Modeler Tool (SSMT)

Methodology:

(a) Use a computer or suitable device to get access to the SSMT online tool.
(b) Learn the key features of the tool by studying the SSMT Guide and tutorials.
(c) Before doing the calculations, click “Preferences” and set the measurement system to SI units.
(d) Perform sample calculations using the Properties Calculators (for Saturated Properties and Individual Steam Properties).
(e) Perform sample calculations using the Equipment Calculators for Boiler, Heat Loss, Flash Tank, PRV w/ Desuperheating, and Header.

(f) Using the Steam System Modeler, generate a Base Model using the random function or any one of the default models.
(g) Develop an Adjusted Model by selecting some projects and system adjustments and combing with the Base Model.
(h) Compare the Base Model to the Adjusted Model and comment on the results.

Evaluation of the Results

Students should organize and present the sample calculations clearly and systematically in the report. They should also describe the inputs and results of the Steam System Modeler by summarizing the information and evaluating the performance of the models.

Submission

Each student should prepare a technical report based on the data and information generated and learnt during the exercises. The report shall not exceed twenty (20) A4 pages and should be submitted through the Moodle. The following guidelines on report writing may be useful.

Features of good reports (University of Reading)
http://ibse.hk/A5_Reports_1.pdf
Structuring your report (University of Reading)
http://ibse.hk/A5_Reports_2.pdf

Useful Web Sites

SSMT Guide, a quick reference for the Steam System Modeling Tool (SSMT)
http://www4.eere.energy.gov/manufacturing/tech_deployment/amo_steam_tool/SSMTGuide.pdf
SSMT Tutorial Videos
http://www4.eere.energy.gov/manufacturing/tech_deployment/amo_steam_tool/tutorials
Spirax Sarco -- Steam Engineering Tutorials
http://www.spiraxsarco.com/Resources/Pages/steam-engineering-tutorials.aspx
Steam Theory (TLV)
http://www.tlv.com/global/AU/steam-theory/
International Association for the Properties of Water and Steam (IAPWS)
http://www.iapws.org/

References

CIBSE, 2015. *Design and Operation of Modern Steam Systems*, CIBSE TM58: 2015, Chartered Institution of Building Services Engineers, London.
Smith, J. G., 1998. *The Efficient Distribution of Steam and Recovery of Condensate*, Australian Institute of Refrigeration, Air Conditioning and Heating, Melbourne, Vic. and Institute of Refrigeration Heating and Air Conditioning Engineers, Auckland. [P 697 A64 DA11]
Spirax-Sarco, 2007. *The Steam and Condensate Loop*, Spirax-Sarco, Cheltenham. [621.194 S79]