

Heat Recovery Steam Generator Modeling

Case Study Summary

Goal:

Analyze the multiphase flows within the waste heat recovery boiler with different environmental temperature ranges.

Requirements:

The model has to provide the thermal analysis with the determination of heat transfer coefficients of cast-iron and steel economizers, estimation of the boiling process in the evaporator, modeling of the separation process of different liquid phases in the separator.

Parameters:

$G_{\text{gas}} = 22.12 \text{ kg/s}$
 $T_{\text{gas}} = 405 \text{ }^\circ\text{C}$
 $G_{\text{water}} = 2.12 \text{ kg/s}$
 $T_{\text{water}} = 100 \text{ }^\circ\text{C}$
 HEXs geometry parameters

Constraints:

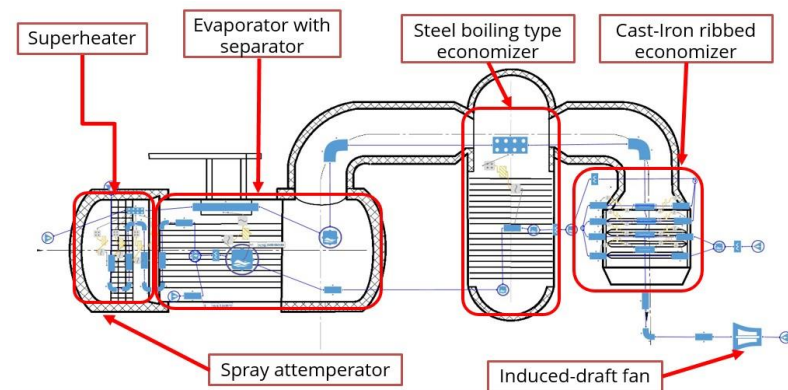
T^* steam at super heater

Results of the Study:

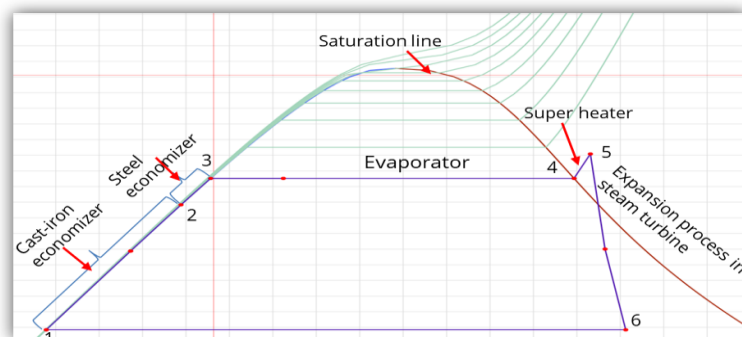
Using interval approach the thermal-hydraulic analysis of HRSG has been performed - the flow parameters and HTCs were estimated while taking the ribbed tubes and boiler process. The amount of steam vs water in separator was estimated.

HRSG Parameters Evaluation

Using the given data parameters, the hydro network consisting of the economizers, evaporator, separator, and superheater were modeled in AxSTREAM System Simulation. The interval modeling method was used to improve and ensure the accuracy of the results.



The cycle parameters were estimated while considering the multiphase flow state.



By successfully applying the steam flow conditions of the boiling and separation processes, the HRSG was modeled quickly and accurately. The model data can be used for integrated thermodynamics cycle analysis.

