Dynamic modelling of a Condenser/Water Heater with the ThermoSysPro Library

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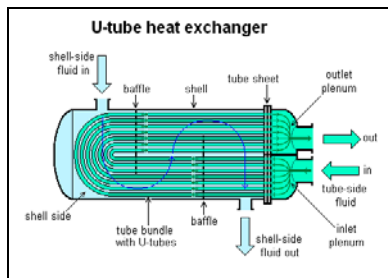12-14 avenue Dutrievoz, 69628 Villeurbanne Cedex, France

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A new dynamic model of a water heater has been developed. The component model is meant to be used for power plant modeling and simulation with the ThermoSysPro library developed by EDF and released under open source license.
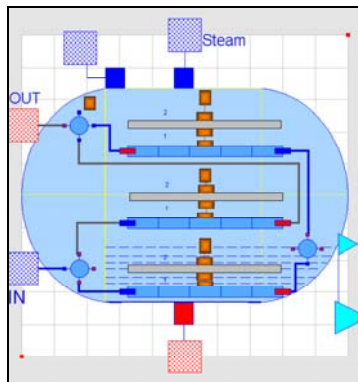
The model and the test conditions are fully described: modeling hypothesis, governing equations, parameter values and test transients.

To validate the model, three difficult transients were simulated: the islanding (sudden plant disconnection from the grid), flow reversal and zero-flow conditions inside the water heater.
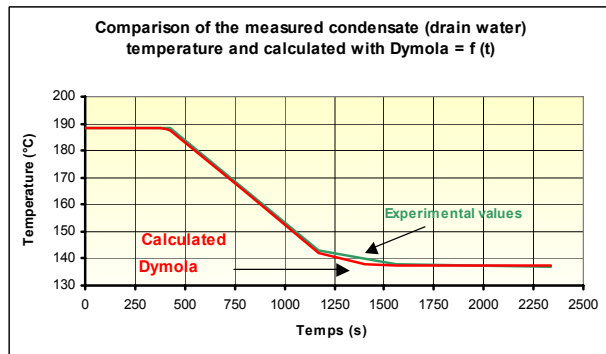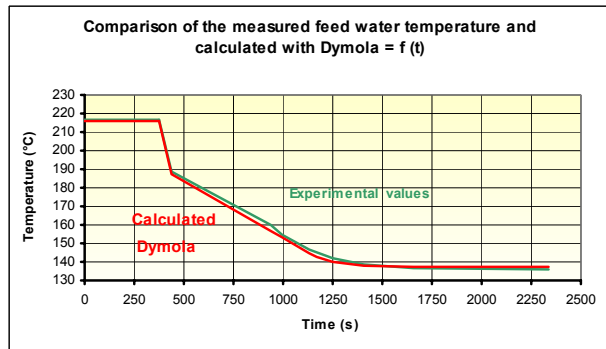
Regarding the islanding scenario, the simulation results are very close to the experimental values measured on site. This transient demonstrates the physical validity of the model at it is fast and challenges the model equations in all operating conditions of the exchanger.

Shell-and-tube heat exchanger

Comparison of the measured feed water temperature and calculated with Dymola = f (t)

Model of the condenser/water heater

Comparison of the measured condensate (drain water) temperature and calculated with Dymola = f (t)

Simulation results of the islanding scenario, and comparison with experiment