Numerical model for thermoeconomic diagnosis in commercial transcritical/subcritical booster refrigeration systems - DTU Orbit (06/12/2018)

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Transcritical/subcritical booster refrigeration systems are increasingly installed and used in Danish supermarkets. The systems operate in both transcritical and subcritical conditions dependent on the heat rejection performance and the ambient conditions. The plant consists of one refrigerant cycle supplying refrigerant for evaporators in both chilled and frozen display cases. In the paper, thermoeconomic theory is used to establish the cost of cooling at each individual temperature level based on operating costs. With a high amount of operating systems, faulty operation becomes an economic, and environmental, interest. A general solution for evaluation of these systems is considered, with the objective to reduce cost and power consumption of malfunctioning equipment in operation. An analysis of the use of thermoeconomic diagnosis methods is required, as these methods may prove applicable. To accommodate the analysis, a numerical model of a transcritical booster refrigeration plant is considered in this paper. Additionally the characteristic curves method is applied to the high pressure compressor unit of the refrigeration plant. The approach successfully determine whether an anomaly is intrinsic or induced in the component when no uncertainties are introduced in the steady state model.

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