Article Abstract

Title:	Assessing heat exchanger performance data using temperature measurement uncertainty
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Abstract:	To ensure operation of heat exchangers, the goal is to verify that the exchanger is performing, or will perform, at its design. This is especially relevant to coolers that typically operate at heat loads reduced from their design basis. In addition, any calculated performance acceptance criteria must also consider uncertainty and error in the experimental measurements of temperature and flow. However, most statistical methods are complex and not easily applied to heat exchangers such as those that serve the power plant industry where data are difficult to obtain and limited in quantity. To address this, a concise, practical, and effective methodology has been formulated, with its emphasis on temperature measurement, based on a Student t-distribution with a 95% confidence level. A review of temperature instrumentation has included expected accuracies of various measurement techniques. Detailed calculations illustrate the significant effect of decreasing the sampling frequency; reducing the number of sensors especially increases the uncertainty level. An 11.6% overall heat load uncertainty due to flow and temperature measurements was computed for a sample water-to-water cooler using steady-state field data. Results were consistent with those of other research efforts.
Keywords:	Heat exchanger, uncertainty analysis, temperature measurement, shell-and-tube.