Discussions for the Technical Papers from the 2025 ASHRAE Annual Conference in Phoenix, Arizona

This is a compilation of the written questions and comments submitted to authors by attendees at the 2025 ASHRAE Annual Conference in Phoenix, Arizona. All authors were given the opportunity to respond.

The questions/comments and authors' responses are published with the papers in the hardbound volume of ASHRAE Transactions, Vol. 131, Part 2.

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A Chilled-Water-Cooler-Capacity Model for Data Center CFD and Other Cooling Digital Twins

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Matthew Kaufeler, Senior Principal Product Engineer, Cadence Design Systems, San Jose, CA: In the introduction, it is suggested that existing commercial data center CFD tools do not account for the impact of varying chilled-water flow rates on cooling capacity in their treatment of chilled-water-based air-cooling units. This statement specifically calls out Cadence Reality DC 2025 as an example, where this simulation tool (previously known as 6SigmaRoom) has accounted for the impact of varying chilled-water flow rate on cooling capacity in this type of air-cooling equipment for a number of years.

James W. VanGilder Technical Lead, Schneider Electric, Andover, Massachusetts: We appreciate the feedback from Mr. Kaufeler. By "accounting for the impact of variable chilled-water flowrates on cooler capacity", our intended context is functionality that allows the user to specify the cooling capacity by way of a single cooling capacity at a single operating condition, and then cooling capacity will be automatically predicted at any other operating point (including water flow rate) by way of a physics-based model. Specifically, it is accounting for the variation in the cooling-coil effectiveness with air and water flow rates that is the tricky part—and the main topic discussed in the paper. By contrast, predicting cooler capacity while assuming a fixed water flow-rate is relatively easy because we know that capacity varies linearly with the difference between return-air and entering-water temperatures (if neglecting fan power). Further (and again for a fixed water flow rate), cooler capacity can be assumed to scale with the airflow rate raised to some power. Of course, with only the latter, simpler approach, you could still model the impact of variable water flow as a series of operating points with different water flow rates, and then interpolate between operating points. We meant the former rigorous-physics approach and not the latter, simpler, semi-empirical approach. Whichever context was meant, we welcome additional feedback or publications on the subject and are happy to stand corrected regarding unpublished proprietary functionality.