Adaptable cooling coil performance during part loads in the tropics - A computational evaluation

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Objectives

Design and assessment of an adaptable cooling coil in which the number of active cooling rows changes as a function of the load

Methodology

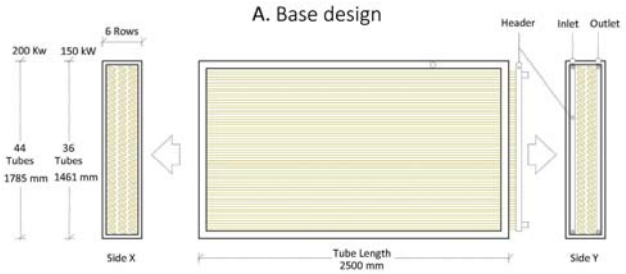
A three-step method

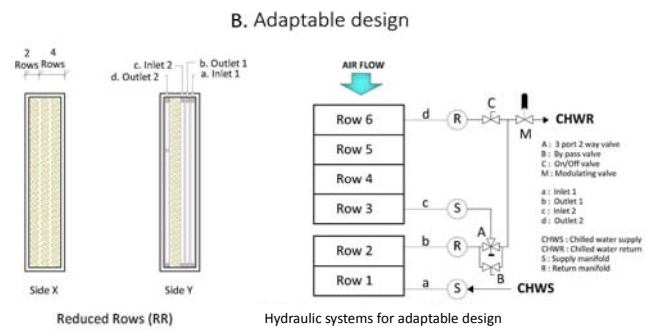
Step 1: Design of two oversized coils (200 kW and 150 kW)

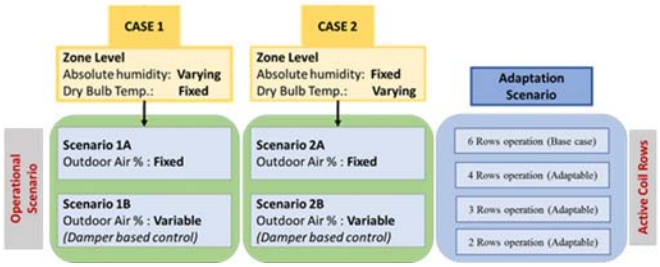
Step 2: A hydraulic system and sensors are proposed to be integrated with the oversized coils

Step 3: Performance assessment of adaptable cooling coil design

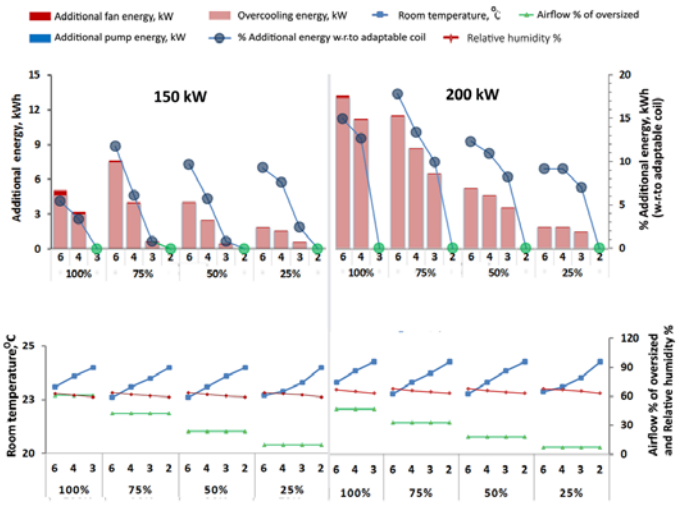
Each oversized coil is simulated for four different part-load operations (100%, 75%, 50% and 25% of actual room load). 128 simulations performed.







Results



Conclusions

- Adaptable coil is able to provide small but relevant improved humidity control down to 25% of the design load (max reduction 0.9 g/kg)
- In special applications (absolute humidity control) there is a substantial energy benefit (up to 18%)
- Its effectiveness reduces at lower part-load conditions

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