

Automated Load-Based Performance Testing Apparatus and Methodology for Air Conditioners and Heat Pumps

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Objective

- Develop & demonstrate low-cost, automated apparatus & methodology for DX AC/HP equipment that includes control response to time-varying building loads and ambient conditions

Motivation

- Low cost approach for mapping equipment performance (particularly split systems)

Approach:

- Heat and moisture gains to ducted apparatus controlled to represent virtual building loads
- Virtual building model responds to time-varying ambient and equipment cooling/heating rates
- Incorporate automated method of optimizing refrigerant charge for split system heat pumps

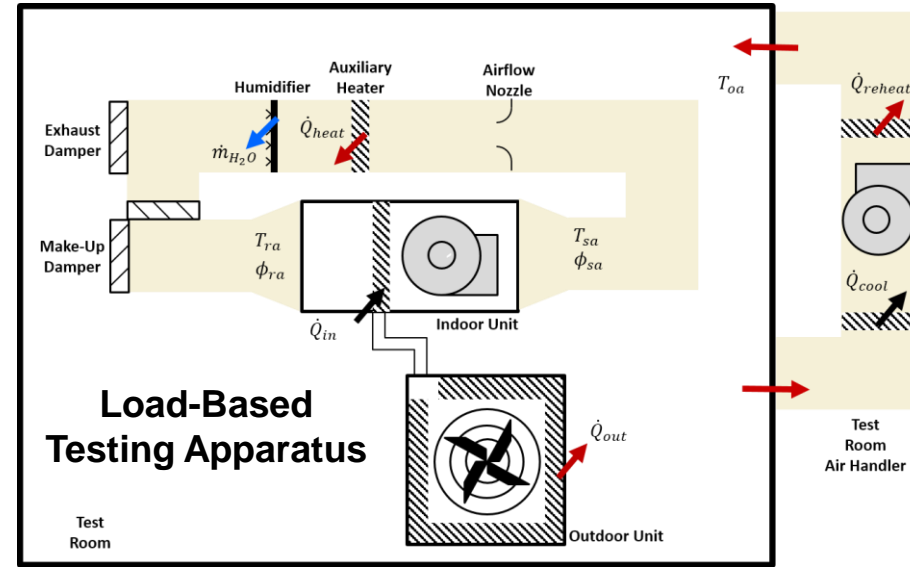
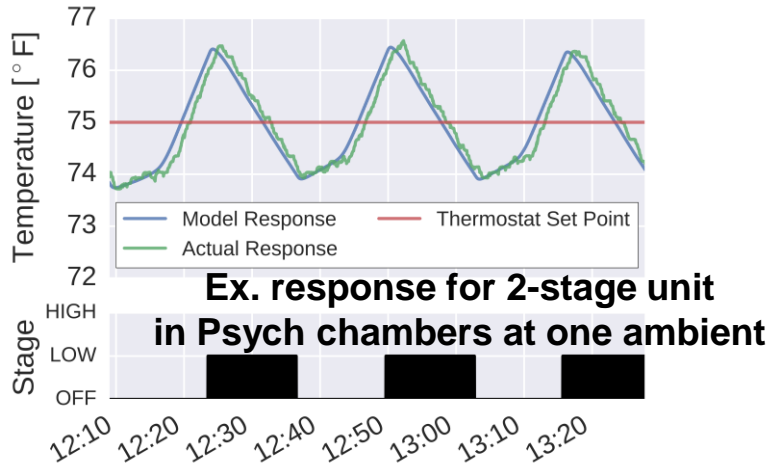
Expected Results / Impact:

- Validated method for generating equipment performance map through automated testing
- Demonstration of automated method for optimal refrigerant charge determination
- Cost effective way to “extract” equipment models for building simulation and climate/building-specific (e.g, hot/humid office vs. moderate/dry data center) energy efficiency ratings

Schedule

- Months 1 – 4: Determine Psych room benchmark performance for variable-speed split system
- Months 2 – 6: Design and construct ducted load-based testing (LBT) apparatus
- Months 6 – 10: Demonstrate and evaluate LBT
- Months 9 – 12: Implement & evaluate automated refrig. charge testing

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Example Load-Based Performance Comparison

