

Challenge Statement: Improving thermal comfort and energy efficiency at CleanTech One

Challenge Theme – Energy Efficient Buildings



Background

- The Energy Research Institute @ NTU (ERI@N) offices at Clean Tech One are cooled via a centralized chiller which distributes chilled water to individual Fan Coil Units (FCUs). The flow rate of the chilled water circulated is controlled by a solenoid valve in the return line of FCU – controlling the flow rate is essential for efficient cooling of a space. One common complaint made by occupant is that the offices can be “overcooled”, leading to thermal discomfort. This in turn leads to both energy wastage and thermal discomfort.



Challenges

- ERI@N is looking for solution(s) that eliminates thermal discomfort from overcooling, while at the same time maintaining or improving the energy efficiency of the cooling system.

Possible Solutions

- High frequency and high responsive solenoid valve
- PID controlled valves
- Special control circuit
- Special control algorithm
- Hybrid cooling for the office



Desired Outcome

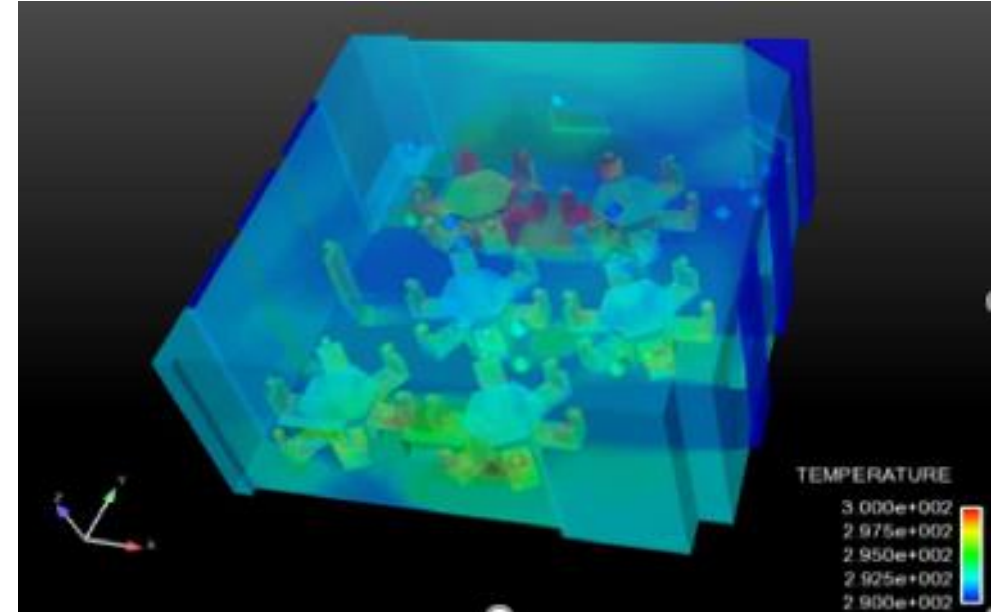
The envisioned solution shall:

- Improve energy efficiency of CleanTech One's ACMV systems by reducing the occurrence of overcooling.
- To improve the occupant comfort levels at ERI@N's offices.

Requirements

The proposed solution should:

- Readily integrate with the existing systems at CleanTech One, with minimal down time (max 9 days, i.e two weekends)
- Have a TRL of ≥ 7
- Achieve thermal comfort at least 95% of the time
- Achieve energy savings of 5-10%



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Testbed/ Trial site

(Envisioned deployment site)

- CleanTech One
- 3 FCUs in a 358m² office space
- Average of 10 people, max occupancy of 25

