



Using Task/Ambient Conditioning to Improve Comfort and Energy Performance

CBE
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Task/ambient conditioning

- **Significance**
 - Thermal dissatisfaction is the major complaint in office buildings
 - Discomfort at local parts of the body
 - Head/hand cooling, foot/hand warming show great potential for improving thermal comfort
- **Objective**
 - Remove local discomfort by using task conditioning systems
 - Improve “thermal delight”
 - Possibility to enhance productivity

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Human subject tests – Devices to be tested



Controlled environment chamber, UC Berkeley

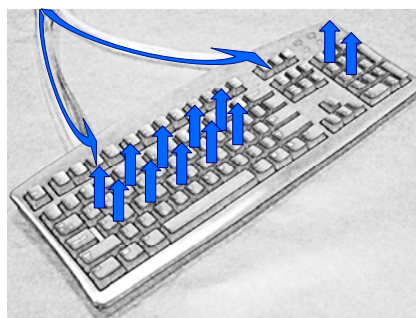
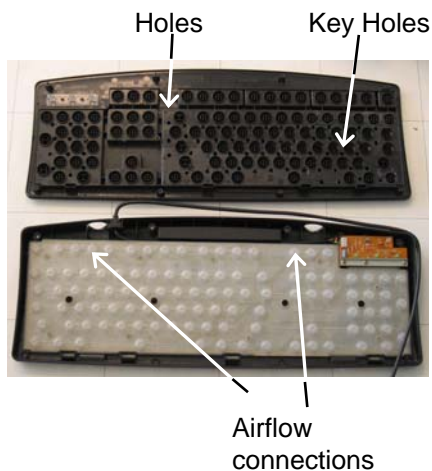
Warm room

- Head cooling
- Hand cooling


Cool room

- Foot warming
- Hand warming

Hand-cooling device: airflow keyboard



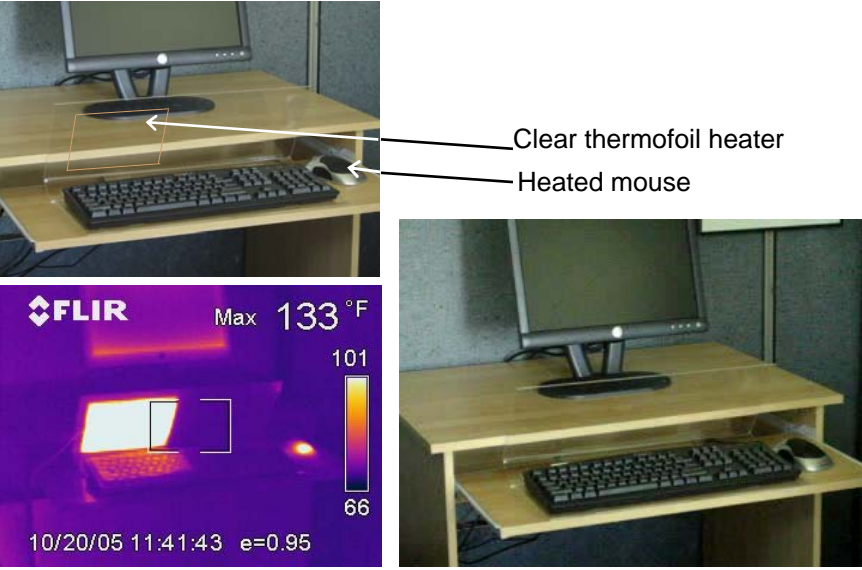
Hand-cooling device: smoke visualization



keyboard without airflow keyboard with airflow

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Radiant hand-warming devices

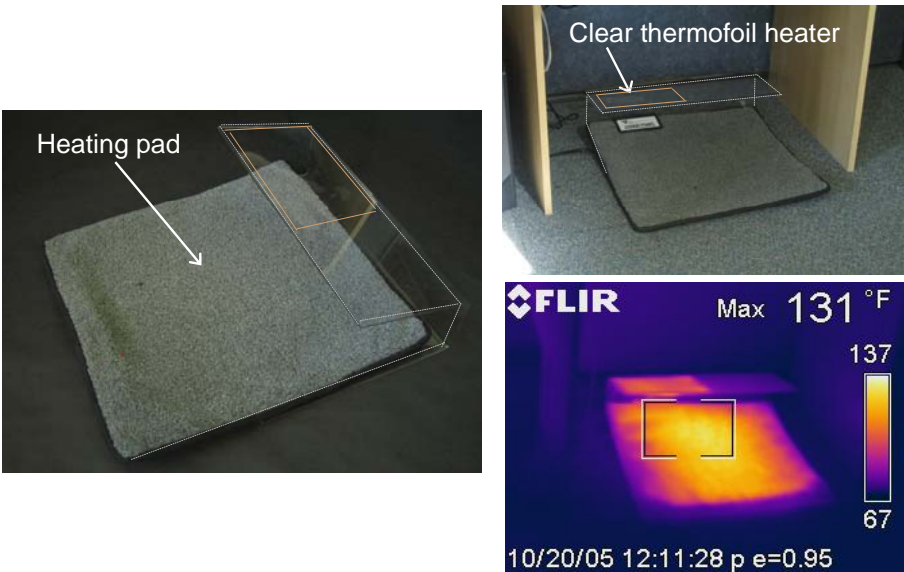


Clear thermofoil heater
Heated mouse

FLIR Max 133 °F
101
66
10/20/05 11:41:43 e=0.95

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Radiant foot-warming devices



Heating pad

Clear thermofoil heater

FLIR Max 131 °F
137
67
10/20/05 12:11:28 p e=0.95

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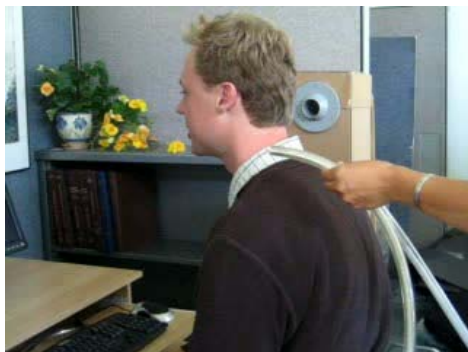
Head-cooling device



Controlled environment chamber, UC Berkeley

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Head-cooling device: smoke visualization



Air motion

- from sides towards breathing zone
- avoid air motion to back of neck (draft discomfort)
- avoid air motion from front (dry eye discomfort)

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Next steps

Human subject tests

- Starting December 2005
- Finalize experiment set up
- Recruit subjects for tests
- Select productivity method
- Conduct measurements in the chamber
- Perform CFD simulations




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Questions?

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The top thermal image shows a room with a window. A white box highlights a bright area on the window, indicating a high temperature. The maximum temperature is 102°F. The bottom image shows a person sitting at a desk. A white box highlights the person's head and shoulders, indicating a high temperature. The maximum temperature is 129°F.

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