Thermal and Visual Comfort Maximization for an Unconditioned Space

2017 Fall
Building Performance Simulation
Xiaoyu Ma

Window Direction: South
Glazing Ratio = 0.3 (original = 0.1)
Comfortable Time Ratio= 40.77%
Hot Time Ratio = 28.77%
Cold Time Ratio = 30.46%

Strategies:
1. Test 4 window direction, find the one with highest comfort time ratio. After testing, keep south facing.
2. Test glazing ratio, find the one provide best daylight environment.
3. Test comfort time ratio with different glazing ratio, find the better one to fit both daylighting and indoor comfort. after testing, change glazing ratio to 0.3 (original = 0.1)
4. Check glare status
5. Check indoor comfort, found that hot time is more than cold time, add shades to the window to reduce heat from radiation.
6. Test different shades, find the best one.

UDLI (100-2000)

Relative Humidity for ZONE_5 (%) - Hourly
Philadelphia International Ap PA USA TMY3
1 JAN 1:00 - 31 DEC 24:00

Air Temperature for ZONE_5 (C) - Hourly
Philadelphia International Ap PA USA TMY3
1 JAN 1:00 - 31 DEC 24:00

Adaptive Comfort for ZONE_3 (-1 = Cold, 0 = Comfortable, 1 = Hot) - Hourly
Philadelphia International Ap PA USA TMY3
1 JAN 1:00 - 31 DEC 24:00

Heating (kWh/m2)

Storage (Monthly)
Cooling (Monthly)
Glazing Conduction (Monthly)
Opaque Conduction (Monthly)
Natural Ventilation (Monthly)
Mechanical Ventilation (Monthly)
Infiltration (Monthly)
People (Monthly)
Lighting (Monthly)
Fan Electric (Monthly)
Equipment (Monthly)
Solar (Monthly)
Heating (Monthly)