CASE STUDY: CONCORDIA UNIVERSITY NEW ENGINEERING BUILDING, MONTREAL, CANADA

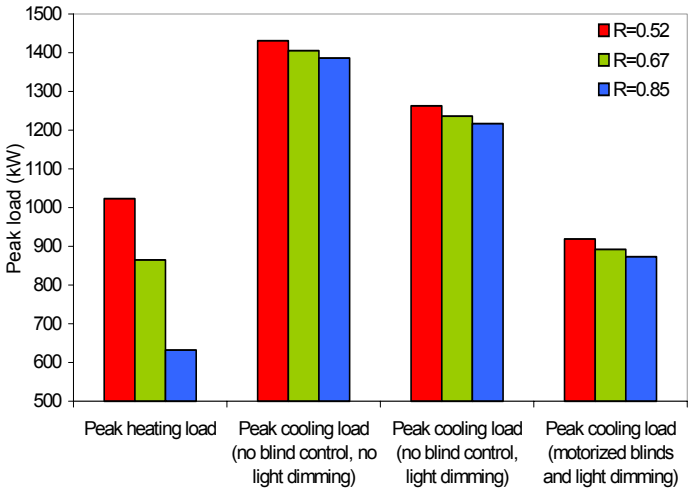
- One year preliminary design study
- Energy analysis of façade design options including daylight, shading, solar gains and impact on HVAC system sizing.
- Variables:
  - ✓ Percent of glass area
  - ✓ Glazing thermal resistance
  - ✓ Shading device type (venetian blinds, roller shades)
  - ✓ Shading device properties (transmittance, reflectance)
  - ✓ Lighting control options
  - ✓ Motorized shading devices

The new 16-storey building

Energy savings due to shading and lighting control (RSI is window R-value):

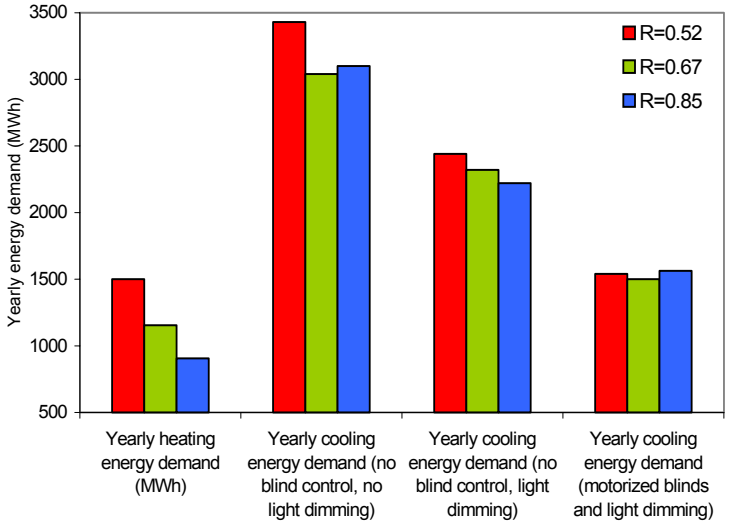
1. Reduction in peak heating and cooling load (reduction of capital cost for HVAC equipment)

Results for a perimeter office on southwest façade:



2. Reduction in heating and cooling energy consumption (reduction in building operating energy costs)

Results for a typical floor:



<u>Economic analysis of impact of design options on capital cost and operating energy costs</u>:

- For perimeter offices:

Reduction in heating capacity due to better glazing thermal resistance: $19,000/year
Reduction in cooling capacity required due to motorization of blinds: $153,000
Reduction in peak cooling demand for electricity (motorized blinds): $20,000/year.
Reduction in cooling electricity consumption due to combined shading & lighting control: $24000/year.

Payback time for motorized blinds including reduction in HVAC system size and operating energy costs for perimeter spaces: <u>4.5 years</u>

- For the 16-storey atrium:

Reduction of cooling system capital cost due to shading: $45,000

Payback time (motorized shades) in atrium: <u>0 years</u>

- For the whole building:

Payback time (motorization of shading devices): <u>2.8 years</u>

Source: A. Tzempelikos & A. Athienitis, “Simulation for façade options and impact on HVAC system design”.