

Thesis Proposal

Breadth Proposal for Spring 2010 Project

WESTINGHOUSE ELECTRIC CO.
NUCLEAR ENGINEERING
HEADQUARTERS CAMPUS

Pittsburgh, PA

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Architectural Breadth

To reduce the external thermal load on the Building, an architectural breadth will be explored. A study of the building's façade will be done to effectively redesign each façade to respond to its orientation. The resulting alterations could possibly dramatically alter the aesthetics of the façade. However, assuming that the current façade design was chosen by the owner and architect for a reason, any alterations will be sensitive to the current design. The addition of light shelves, glazing area change, coloration, and materials will all be explored to enhance building performance thus altering the architectural character.

Lighting Breadth

In addition to an architectural breadth, a lighting breadth will be done with an overall goal to reduce the lighting requirements for the open office spaces. Light shelves will be explored to possibly reduce the need for as much artificial lighting. These light shelves can be projected from the building's façade to also act as a solar shade. The implementation of solar shades has an architectural aspect to them as they will be a prominent feature on the building's façade.

Overall, the addition of light shelves may be an inexpensive addition with major impacts to the design of the building's mechanical system.

Tools for Analysis

Architectural and Lighting Breadths

The architectural breadth will focus on redesigning the exterior envelope to be more responsive to its direction. The façade study will be done using a 3D design program e.g. Google SketchUp, AutoCAD 3D. The resulting redesigns will be implemented back into the Trane Trace energy model and will result in a thermal load reduction.

The Lighting Breadth encompasses a study of how the use of light shelves can reduce the lighting energy usage. Therefore a lighting simulation program will be run on a typical office space to determine the effectiveness of the shelves. Additionally, the solar shade aspect of this addition will be modeled into the existing Trane Trace model to determine its overall effect in reducing the cooling load.