

R E N S S E L A E R P O L Y T E C H N I C I N S T I T U T E  
School of Architecture

Position for a  
**Doctoral Student**

**Research Project**

**“Active Building Envelopes: Design, Optimization, and Experimental Validation”**

Space conditioning currently accounts for over 50% of the energy used in the average building, the bulk of this energy is needed to compensate for energy losses that occur through a building's envelope. Conventional strategies to mitigate thermal losses or gains in building-envelopes rely on passive insulation approaches. Separate heating and cooling systems then compensate for energy losses or gains that do occur.

Our research on Active Building Envelope's (ABE) will allow us to study a new approach for dealing with thermal losses through materials. ABE systems will actively use solar energy to pump heat in the direction opposite to the passive heat conduction direction. The successful development of this technology will effectively eliminate the need to supply other energy sources to thermally condition buildings or other enclosures. This multi-functional ABE-system involves the integration of energy receptor, transducer, storage, control, and distribution technologies into the building envelope

The research will take approximately four years to complete and will involve three Phases. During the first Phase we will develop representative ABE-system engineering and economic computational models, and the subsequent optimization of these models using the physical programming optimization method. During the second Phase, we will validate the modeling and optimization results through testing of ABE-system prototypes. The third Phase involves a comprehensive evaluation of the ABE-system modeling, optimization, and testing effort.

**Requirements**

The candidate should have an appropriate technical background and a strong interest in architecture. A master or equivalent degree is required to start doctoral studies at Rensselaer Polytechnic Institute. This project is financially supported by the National Science Foundation (<http://www.nsf.gov>). There will be full financial support, including tuition and a nominal stipend. The student is expected to start fall 2004; the deadline for graduate application is January 15. For information on Rensselaer Polytechnic Institute, and eligibility requirements for doctoral studies, please visit: <http://www.rpi.edu/dept/grad/>. For more information on the project, please contact:

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