UT-BATTELLE

OAK RIDGE NATIONAL LABORATORY

FACT SHEET

MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY

THE BTC'S BUILDING ENVELOPE TEST FACILITIES

A World-Class User Facility

The building "envelope"—walls, roof, and foundation—is the thermal barrier between the indoor and outdoor environment and is one of the key determinants of a building's energy requirements. The BTC houses a DOE National User Facility for R&D on the building envelope. Research focuses on improving not only the systems that make up the roofs, walls, and foundations of buildings, but also the insulating materials that these systems contain. Researchers investigate the ways that heat, air, and moisture travel through the building envelope and the effects that various building materials have on energy consumption. The goal of this research is to identify, develop, and deploy energy-efficient building materials and envelope systems that will be adopted by the U.S. building industry.

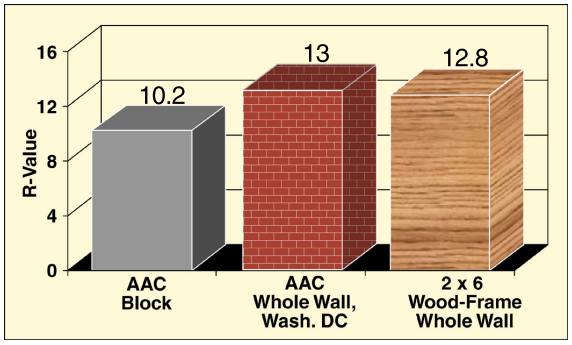
Envelope Test Capabilities

The user facility has four major experimental apparatuses: the large-scale climate simulator, the rotatable climate simulator, the roof thermal research apparatus, and the envelope systems research apparatus. These apparatuses (described fully on the BTC's web site at http://www.ornl.gov/roofs+walls/index.html) are used to test full-size walls, fenestration, and roof and floor systems.

TVA and BAAB Lumber built a test wall using flyash from a TVA coal-fired power plant.

The Web-Based Calculator

Using the data acquired in tests, BTC researchers have developed the web-based Whole-Wall Thermal Performance Calculator (http://www.ornl.gov/roofs+walls/whole_wall/wallsys.html), an interactive calculation tool that can accept a simple description of custom building plans and enable the Internet user to compare uniform whole-wall R-values for more than 40 different wall systems.



A flyash AAC block-wall house is just as energy-efficient as a 2 x 6 wood-frame house in Washington, D.C.

Excellent Example of DOE's Partnerships with Private Industry

From 1996 to 2001, the BTC's envelope test equipment has attracted 200 private-industry users, who have cost-shared more than $4 million toward building envelope systems and materials research. The major interest is development of more energy-efficient roofs and walls. Twenty-five of these roof and wall industry users have brought 67 different wall systems to the BTC for a whole-wall performance evaluation.

The 200th user of the BTC's thermal envelope test equipment is the Tennessee Valley Authority (TVA) and BAAB Lumber, whose interest is to further develop and deploy a building block made with 70 wt % flyash from TVA's coal-fired power plants. Following the laboratory thermal testing, an energy-efficient Habitat for Humanity house will be built in Chattanooga, Tennessee, and monitored for a year. This project will help DOE reach both of the broad goals underlying the most recent National Energy Plan—providing energy supply in an environmentally responsible manner and promoting energy conservation. It will also provide more data for the BTC's Whole-Wall Thermal Performance Calculator.

Contact:
André Desjarlais
Phone: 865-574-0022; fax: 865-574-9338; e-mail: desjarlaisa@ornl.gov

BUILDINGS TECHNOLOGY CENTER ornl

Energy Division

ORNL 2001-03346/jcp