ENERGY EFFICIENT HOUSING FACILITY

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Research Focus

The Masonry Research Group in the Discipline of Civil Engineering has established the Energy Efficient Housing Facility as a research centre of excellence in developing an improved understanding of the thermal performance of Australian housing. In particular, the thermal characteristics of various walling, roofing and slab systems are being studied with an emphasis on the role of thermal mass in energy performance. The Masonry Research Group at Newcastle is by far the most active masonry research group in Australia. Over the last 15 years the group has received in excess of $5 million in research and consulting income with its leader, Emeritus Professor Adrian Page, being supported by funding from Think Brick Australia (formally the Clay Brick and Paver Institute) since 1992.

Current Projects

Structures and Materials Research

The Group is involved in a range of projects in these areas including bond strength studies, shear wall behaviours and design, wall tie performance and design, seismic retrofit and repair and reliability studies for masonry structures. Of particular importance to the brick industry is the seismic performance of masonry structures, as earthquake design of all structures (including housing) is now mandatory. When the new regulations were first introduced, the Group was pivotal in justifying that many existing details were adequate for earthquake design, and developing appropriate modifications for others. This resulted in the amendment of the earthquake loading code. Continuing experimental and theoretical research in this area will impact significantly on future building standards in Australia.

Thermal Performance and Energy Efficiency of Housing

In energy-related research of particular interest to industry is the groundbreaking research being conducted on the thermal performance of masonry housing. Increased emphasis is being placed on thermal performance of buildings, with energy rating systems for housing now in place. These emerging regulations need to be supported with background research to provide real data on building performance. In collaboration with Think Brick Australia the Group is involved in an 8 year, $1.5m study on the thermal performance of housing supported by funding from industry, the Australian Research Council and the University of Newcastle. As part of this research, an ASTM thermal hot bos apparatus has been developed (the only one of its type in Australia). This allows for detailed studies of the thermal performance of various walling systems. A key feature of the research program has been the construction of four full scale test house modules on campus, which has allowed researchers to properly monitor and study the thermal performance of complete building systems and develop realistic numerical simulations of thermal behaviour. A complementary full scale roof testing facility has also been developed. A range of walling and roofing systems are being considered (cavity brick and brick veneer with and without insulation, lightweight construction, tiled and metal roofs etc). The effects of windows are also being considered. In parallel with the experimental study, a parallel analytical study is in progress with thermal modelling software in an advanced state of development. One of the key features of the software is that it is being verified using the actual date collected from the test module and an existing cottage located elsewhere on campus.

Experience

The Masonry Research Group is nationally and internationally recognised for its expertise in masonry research in the areas of structural engineering, material performance and building science. Members of the Group have been actively involved in the development of Australian masonry standards, with researchers affiliated with the Group having close ties with the Standards Australia BD/4 Masonry Structures Code Committee, and other regulatory groups (Professor Page is the Chair of the BD/4 Committee). The Group has access to state of the art testing and data acquisition equipment and technical support and the researchers in this group utilise these facilities regularly to assist with specialist consulting to industry and government.

Equipment

This research facility has access to excellent structural testing facilities including a range of universal testing machines, a comprehensive 'strong floor' and 'strong wall' facility as well as state of the art data acquisition equipment and technical support to assist with specialist consulting to industry and government. ASTM Thermal Hot Box Apparatus and Housing Thermal Test Modules

Contact Us

PRIORITY RESEARCH CENTRE FOR ENERGY

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