ARCHITECTURAL ENGINEERING RESEARCH AND CONSULTANCY

FACULTY OF TECHNOLOGY, DESIGN AND ENVIRONMENT

Architectural Engineering Group
The group, within the Faculty of Technology, Design and Environment, is an interdisciplinary research team working in the fields of construction technology, structures, building physics and sustainability. Based in new state-of-the-art facilities, the group is involved in both pure and close to industry research with a portfolio of high profile UK, European and international partners and clients.

A broad range of technical skills are available including: architecture and design, building physics, structural and mechanical engineering and construction economics. The group works closely with industry, research councils, UK and EU governments, and construction sector organisations such as the Steel Construction Institute (SCI), the Timber Research and Development Association (TRADA) and BuildOffsite to provide a holistic and tailored research, consultation, testing and certification service to a varied client base.

OUR PHILOSOPHY

The group works at the leading edge of research and cascades the benefit of this to clients. It collaborates closely with clients’ own in-house teams and provides informed wide ranging and integrated technical support of the highest standard.
ARCHITECTURAL ENGINEERING & RESEARCH CONSULTANCY

SERVICES

Tailored support is offered to meet clients’ needs and achieve compliance with codes and standards. It can develop products, systems, or approaches from initial design through to analysis, prototype testing, certification and delivery to market.

Our main areas of expertise include:

- Offsite and Modern Methods of Construction
- Physical Element Testing
- Construction Economics
- Building Product Development
- Building Physics Analysis
- Building Performance Evaluation
- Carbon Mapping
- Testing and Accreditation

Case Study
Avante Housing Co-heating Tests

A co-heating test was undertaken as part of a wider TSB-funded project to assess as-built performance of an end-of-terrace house in Kent. The house was heated to 25°C for three weeks in February, measuring total energy consumption of heaters and fans. The housing development was constructed to the Ecohomes standard, and was found to conform to SAP performance for fabric and air infiltration energy losses. The study included heat flux testing of the party wall and a full thermographic survey to assess heat loss at a very detailed level. Co-heating tests close the loop between as-designed and as-built heat loss performance, providing valuable insights into potential problem areas such as site build practice and conformity with specifications.
Offsite and Modern Methods of Construction Consultancy

- Innovative building systems development
- Modular construction
- Product testing and development

Physical Element Testing

- Structural testing of components and systems
- Air-tightness testing of building envelope components
- Thermal testing (heat flux)

Building Product Development

- Prototyping and construction modelling
- Materials advice
- Performance modelling

Carbon Mapping

- Environmental performance
- User satisfaction with buildings
- Post-occupancy evaluation
Construction Economics

- Life cycle costing
- Economic appraisal of novel technologies
- Development of optimum cost technical strategies

Building Physics Analysis

- Steady state and dynamic numerical modelling
- Building simulation
- Lighting analysis
- Air-tightness of cladding
- Performance prediction and optimisation
- Building regulation compliance
- Condensation analysis

Building Performance Monitoring

- Co-heating (building heat loss) tests
- Monitoring of buildings and novel systems
- Lighting monitoring

Testing and Accreditation

- Performance testing
- Proving for accreditation, certification and compliance
- CE marking
Testimonial

The group has a powerful portfolio of skills in the areas of construction technology and building physics and a long and consistent record of close to industry and pure research.

It has recently acquired new laboratory facilities, which complements the already excellent computer based facilities. These two combined will, I am sure, bring more benefits to the ongoing development within the construction industry in general and to the building envelope and offsite sectors in particular.

Ian Clarke
Applications Development Manager
Tata Steel Colors
LABORATORY ACTIVITIES

The well equipped modern laboratory facilities at Oxford Brookes University have been developed to support a wide range of testing and development needs for industry and research.

Physical Testing

The laboratory is equipped to undertake a variety of structural and building physics testing. It includes a range of permanent test rigs alongside bespoke apparatus configured for individual projects.

Building physics testing includes airtightness of envelopes and thermal performance assessment under carefully controlled conditions.

Structural testing capabilities range from the assessment of mechanical properties of small materials samples to performance appraisal of cladding elements, major structural sections, composites and full scale building assemblies such as storey height panels and trusses. The latest state-of-the-art control systems ensure reliable incremental loading and unloading coupled with accurate measurement and rapid data acquisition.

All test activities are supported by good quality recording and reporting and clients are invited to participate in and witness activities thus gaining first hand insight into the performance of their products.

Analysis

Advanced software is used for dynamic thermal simulation of whole buildings using real weather data to determine projected heating/cooling loads, thermal comfort and daylighting performance. Individual building details can be analysed with the latest three dimensional conduction modelling software to evaluate heat flows (thermal bridging) and surface temperatures to assess surface condensation risk.

The group has capabilities in advanced computer-based structural analysis. These often inform the design of components and assemblies that are subsequently tested in the laboratory, and help project teams to accurately understand and optimise performance.

Building Monitoring and Review

The laboratory has a full inventory of equipment to carry out as-built thermal testing of buildings (co-heating tests) to establish fabric losses for comparison with design values and to diagnose reasons for any variance. Discreet ongoing monitoring equipment can be installed to provide detailed in-use energy data, linking to post-occupancy surveys. Thermographic studies of buildings using top-of-the-range thermal imaging cameras to identify areas of concern on the building envelope can also be undertaken by qualified staff.

Working in conjunction with the Low Carbon Building group, environmental performance and user satisfaction with buildings can be assessed using the latest techniques for post-occupancy evaluation.

Accreditation

Staff can guide clients through the processes from enquiry to award, identifying appropriate standards and procedures and, when necessary, liaising with the relevant external bodies on behalf of the client.

The group, often working with its partner organisations, has the ability and experience to assemble the resources required to carry out testing and analysis for certification and accreditation of building products, and for CE marking. Many of the resources are typically available within the laboratory or within the team. Special product specific testing may be configured to meet individual needs.