Civil Engineering Research - Structural Engineering

Structural engineering is vital to an efficient and effective development built environment. As urban development and global urbanisation take place, the Structural Engineering group has focussed its efforts on structural integrity and serviceability, sustainable design, disaster resilience, structural robustness and innovative structural materials. Working collaboratively with colleagues from academia and industry, we have looked at novel structural materials, energy-producing structures, renewable energy structures and zero-CO2

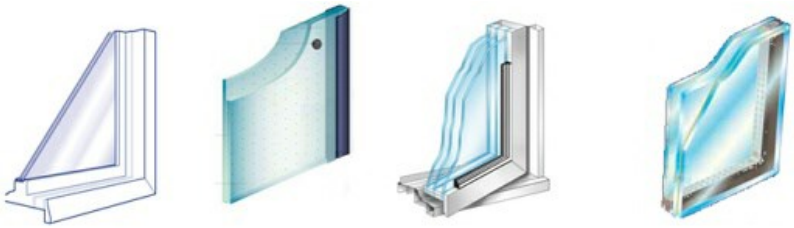
These topics are tackled in collaboration with other School's research groups and subjects include High Strength Steel (HSS) structures, glass (energy-producing and energy-efficient facades), load bearing glass constructions, composite panels (timber, synthetics, fibre-reinforced etc.), cold-formed structural members, structural insulated panels and new generation concretes. Particular emphasis is given to Wind Energy Structures design and in particular, to Building Integrated Wind Turbine BIWT-structures and to zero CO2 emissions policy related topics.

Photograph courtesy of Lightworks Photography/Barrett Byrd Associates

Open all sections

Research activities in Structural Engineering

This discipline of Structural Engineering is fundamental to many other areas of research, growing originally as a result of investigating the structural response of reinforced concrete and steel structures. Today, the team at Birmingham carries out research alongside the requirements of modern structural design codes and therefore consider structural integrity, robustness and serviceability within cutting-edge research into structures and their components. Work includes the study of conventional and advanced structures (such as load-bearing glass and High Strength Steel structures) which provides a comprehensive range of research interest around the theme of structural Integrity, serviceability, structural robustness and advanced structures design.



Professor Charalampos Baniotopoulos (/staff/profiles/civil/baniotopoulos-charalampos.aspx), **Dr Jian Yang (/staff/profiles/civil/yang-jian.aspx)**, **Dr Samir Dirar (/staff/profiles/civil/dirar-samir.aspx)** and **Dr Pedro Martinez-Vazquez (/staff/profiles/civil/martinez-vazquez-pedro.aspx)**, have expertise covering theoretical and numerical modelling, as well laboratory and field testing.

Current research projects include:

- studies in structural materials (including **High Strength Steel for long span structures (/Documents/college-eps/civil/research/research-student-web-page-proforma-ii.pdf)**); carbon fibre-reinforced prestressed concrete beams, pre-cast concrete cross-walls, Structural Insulated Panels,
- integrated functional/structural glazing units and cold-formed steel structures);
- structural component design, e.g. novel design methods of cold formed steel structures; off-site construction methods facilitated by novel construction materials;
- recycled concrete and its structural use;
- performance-based design of concrete wind turbine tower considering the corrosion-induced degradation and fatigue damage.
- **Investigation the Dynamic Response of Acceleration-sensitive Non-structural Components Integrated on Irregular Reinforced Concrete Structures (pdf) (/research/activity/civil-engineering/structures/non-structural-components-irregular-reinforced-concrete-structures.pdf)**

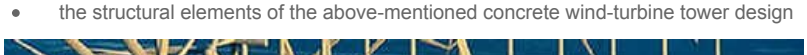
Research activities in the Design of Wind Energy Structures

The discipline of the design of Wind Energy Structures (WES) concerns research activity on wind energy technology infrastructure and, principally, wind energy towers. The use of High Strength Steel (HSS), innovative component joining techniques and alternative solutions for the foundations are among the topics investigated.

Professor Charalampos Baniotopoulos (/staff/profiles/civil/baniotopoulos-charalampos.aspx) and a group of talented research students have a number of projects in this topic and focus on the optimisation of the structural design of wind energy towers.

Research projects of note involve the study of:

- **high strength steel towers for wind energy systems (/Documents/college-eps/civil/research/structural/hu-yu-proforma.pdf)**; wind energy structures, foundations and micropiles;
- the structural elements of the above-mentioned concrete wind-turbine tower design



Sustainability and Resilience issues in Structural Engineering

This discipline concerns research activities on sustainability and resilience topics in structures. Construction activities consume more raw materials by weight (about 50%) than any other industrial sector.

Furthermore, demolition activities also create the largest waste streams. Optimised design, material choice, recycling waste construction materials can contribute significantly to a zero-CO2 embedded energy and waste strategy.

Professor Charalampos Baniotopoulos (/staff/profiles/civil/baniotopoulos-charalampos.aspx) , **Dr Jian Yang (/staff/profiles/civil/yang-jian.aspx)** and **Dr Samir Dirar (/staff/profiles/civil/dirar-samir.aspx)** together with their research students, are currently investigating

- sustainable steel buildings;
- concrete with recycled aggregates;
- fibre reinforced concrete with recycled aggregates;
- energy-saving building facades.

Opportunities relevant to this theme

This active research group is always looking for good postgraduate research candidates. For general enquiries, please contact us (details below) or search on the **Postgraduate Research Degrees (/schools/civil-engineering/postgraduate/research-degree.aspx)** web pages.

We also offer taught postgraduate programmes, including:

- **MSc/PG Diploma/PG Certificate in Civil Engineering (/postgraduate/courses/taught/civil-engineering/civil-engineering.aspx)**
- **MSc/Diploma/PG Certificate in Civil Engineering and Management (/postgraduate/courses/taught/civil-engineering/civil-engineering-management.aspx)**
- **MSc/PG Diploma/PG Certificate in Construction Management (/postgraduate/courses/taught/civil-engineering/construction-management.aspx)**
- Msc/PG Diploma/PG Certificate in Structural Engineering Practice (New in 2014)

Staff in the Structural Engineering group

- **Professor Charalampos Baniotopoulos (/staff/profiles/civil/baniotopoulos-charalampos.aspx)** (head of group)
- **Dr Samir Dirar (/staff/profiles/civil/dirar-samir.aspx)**
- **Dr Pedro Martinez-Vazquez (/staff/profiles/civil/martinez-vazquez-pedro.aspx)**
- **Dr Jian Yang (/staff/profiles/civil/yang-jian.aspx)**
- **Dr Sakdirat Kaewunruen (/staff/profiles/civil/kaewunruen-sakdirat.aspx)**
- **Dr Marios Theofanous (/staff/profiles/civil/theofanous-marios.aspx)**

Enquiries to

For postgraduate researchopportunities, please contact
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For postgraduate taught courses and MScs, please contact
Ms Sarah Williams, Tel +44(0)121 414 5136, Email **s.l.williams@bham.ac.uk (mailto:s.l.williams@bham.ac.uk)**

To discuss a new research project or to explore applying the group's research to your business, please contact
Dr David Boardman, Knowledge Transfer Manager, Tel +44(0)121 414 5086, Email **d.i.boardman@bham.ac.uk (mailto:d.i.boardman@bham.ac.uk)**