CAPABILITY STATEMENT

SWINBURNE UNIVERSITY OF TECHNOLOGY

Centre for Sustainable Infrastructure

Overview

The Centre for Sustainable Infrastructure (CSI) provides a focus for multidisciplinary research in the field of sustainable civil infrastructure. Infrastructure is critical to the economic wellbeing of Australia with some $40 billion invested annually and is a topic of national importance in the 21st century. Infrastructure underpins the delivery of essential services, drives economic growth, supports social needs and is closely linked to the high quality of life enjoyed by the developed world.

Contemporary challenges facing the community include extending the life of ageing infrastructure and the provision of new infrastructure for a growing population in a cost-effective and environmentally sustainable manner. The life cycle of any infrastructure system involves planning and procurement, design and construction, and performance monitoring and renewal. In each of these phases different research challenges exist, including the impact of new technologies, incorporation of sustainable materials, modelling and retrofitting for deterioration effects, asset management and the impact of extreme loads, climate change and the carbon economy.

Our research focus

The centre has three major research programs bringing together industry partners, centre staff, research fellows and graduate students:

- advanced structural and geotechnical systems
- transportation systems
- water resources engineering.

The research is carried out using analytical and experimental techniques that suit the project requirements, and emerging technologies are always considered.

Facilities

The centre has access to a number of state-of-the-art facilities:

- Smart Structures Laboratory – A $15 million laboratory for large 3D static and dynamic testing up to 500 tonnes.
- Geotechnical Laboratory – A $1 million fully automated laboratory with facilities including triaxial and direct shear equipment and Rowe consolidation cells.
- Hydraulic Test Facility – A constant head facility with flow rates up to 50 litres per second that is used for developing and testing innovative screening devices for storm water and sewerage systems.

Recent projects

Some of the centre's current and emerging projects are in the following areas:

Advanced structural and geotechnical systems

- Proof testing and performance rating of building products.
- Strength and drift capacity investigation of structural systems.
- Structural health monitoring and retrofitting structural systems.
- Development of long span integrated floor systems.
- Applications of reclaimed and new materials in civil infrastructure.
- Use of concrete technology.
- Integrated pavement design using reclaimed materials.
- Geotechnical laboratory testing, field instrumentation and in situ testing.
- Ground improvement, soil stabilisation and geosynthetic applications.

Transportation systems

- Retrofitting of electric vehicles.
- Electric drive train, control systems, battery charging, battery capacity indication, regenerative braking.
- Modelling of wear and rolling contact fatigue at the wheel rail interface for improved performance.
- Fatigue modelling and damage mechanics of rail welds.
- Stress analysis of railway rails, effects of irregularities.
- Development of new rail and wheel materials to improve performance.
- Knowledge management systems for transport asset management.
- Modelling low-volume road performance.

Water resources engineering

- Deterioration modelling of water supply, stormwater and sewerage systems.
- Screening devices for urban stormwater and sewerage systems.
- Sustainable water resource management.
- River and wetland hydrology and morphology.
- Hydraulic modelling of rivers and wetlands.
- Desertification.
- Water, soil and vegetation interactions in semi-arid environments.

Industry involvement

The centre welcomes opportunities to further establish and broaden links with industry to facilitate research opportunities and to ensure that research outcomes are focused on the needs of society.

Staff have a number of alliances and linkages with government and industry, and research centres and universities around the world. A number of staff are involved in the technical and management committees of Standards Australia and Engineers Australia.

The centre has undertaken many collaborative research projects and currently provides specialist consulting advice to a number of leading consulting firms and industries, including construction, infrastructure service providers, energy, mining, petrochemical, manufacturing and government organisations.

Education

We provide education and training through undergraduate and postgraduate civil engineering degree coursework programs and a vibrant and supportive research environment for PhD students.

Contact us

Location

Swinburne University of Technology
Hawthorn, Melbourne, Australia

Key contacts

Professor John Wilson
Director,
Centre for Sustainable Infrastructure
Telephone: +61 3 9214 4882
Email: jwilson@swin.edu.au

Professor Jay Sanjayan
Deputy Director,
Centre for Sustainable Infrastructure
Telephone: +61 3 9214 8034
Email: jsanjayan@swin.edu.au

General information

Miranda Beale
Administrative Officer,
Centre for Sustainable Infrastructure
Telephone: +61 3 9214 8455
Email: csi@swin.edu.au
www.swinburne.edu.au/engineering/csi

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