Research Centre for Geotechnical & Railway Engineering (GRE)

Improving the design and performance of major infrastructures: University of Wollongong: Prof. Buddhima Indraratna

Australia's Railway Industry is reinventing itself to become the major mode of land transport in the 21st century, with the main challenge of creating a competitive edge through imaginative ideas, innovative research leadership and cutting-edge technology. In addition, the vast majority of the population lives on the coast where the soft and compressible marine soft clays in Australia present significant construction challenges with regard to the design and performance of major infrastructure, such as the stability of transportation systems.

Interdisciplinary research

Given the design and maintenance challenges associated with rail tracks used by heavy freight and high speed passenger trains along terrains characterized by adverse ground conditions (often encountering very soft clays and slope failures), Centre for Geomechanics and Railway Engineering at University of Wollongong has been built around several interdisciplinary research phases (e.g. geotechnical, geological, mechanical and structural) interacting between ground conditions, wheel loading and rail track performance.

The existing and proven research excellence through an active group of currently 35 full-time Research Students and 10 postdoctoral research fellows working under 7 tenured geotechnical academics places UOW's geotechnics and railway engineering research at the top of the region in a number of key areas including:

- Soft soil engineering and ground improvement
- Stability assessment of rail corridors and road embankments
- Dynamic modelling and prediction of rail track performance in problematic soils
- Assessment of rail ballast degradation
- Monitoring of slope movements
- Landslides hazards and risk management
- Improvement of soft and erodible clay foundations

- Remediation of acid sulphate soils to prevent environmental damage and corrosion of infrastructure components
- Use of geosynthetics for improving the performance of infrastructure
- Dam engineering including filtration and internal instability assessment

Collaborations

The extensive research collaborations with various Industry bodies, such as:

- Roads and Traffic Authority (NSW)
- Department of Main Roads (Queensland)
- Coffey Geotechnics
- Douglas Partners
- Snowy Mountains Engineering Corporation
- Chemstab
- Port Kembla Port Corporation
- Polyfabrics (Australia)

These collaborations have resulted in modern ground improvement techniques. Researchers of the Centre under the auspices of the CRC for Rail Innovation and in collaboration with other rail organisations (RailCorp, Queensland Rail, ARTC and TMG), have established an expert research group in this area.

Recognition

National and International recognition gained through various awards, such as:

Vice-Chancellor's Awards for outstanding research achievements

- 2009 Best Research & Development collaboration award for Rail Innovation under Business-High Education Round Table (BHERT) sponsored by the Australian Commonwealth
- 2009 EH Davis Memorial Lecture for Prof. Indraratna for his contributions to geotechnical theory and practice
- Several awards for researchers by the International Association for Computer Methods and Advances in Geomechanics (IACMAG)
- 2007 Robert Quigley Award by the Canadian Geotechnical Society for outstanding publication in the area of soft soil consolidation

Numerous invited Keynote addresses in reputed Conferences by members have brought immense prestige to the leading-edge research undertaken within the GRE Centre.