

## Chandrakant Desai Memorial Webinar Series\*

# Advances in Transport Geotechnics – Soil Fluidisation and Track Instability, Net-zero and Circular Economy Perspectives

### DISTINGUISHED PROFESSOR BUDDHIMA INDRARATNA

Director of Transport Research Centre, Faculty of Engineering and Information Technology  
University of Technology Sydney (UTS), Ultimo, Australia



**Thursday, July 2 | 10:30—11:30 P.M. (U.S. Central Time)**

To register, scan the QR code or visit: <https://bit.ly/3QzTyCN>

Hosted via TEAMS

### ABSTRACT

Ballasted tracks remain the backbone of passenger and freight rail in most nations due to their cost efficiency, high load-bearing capacity, and effective drainage. Yet over time, ballast degrades, causing differential settlement and track instability. The intrusion of fluidized fines from the substructure, commonly known as mud pumping, reduces shear strength, impedes drainage, and accelerates track deformation, increasing maintenance demands and repair costs. Future track upgrades must go beyond performance alone. Integrating sustainable materials within a circular economy framework offers a pathway to improved resilience and net-zero targets. Promising alternatives such as recycled rubber and mining waste blends offer significant potential, but their behavior under repeated dynamic loading must be understood to ensure long-term reliability.

In this presentation, these aspects are examined through fully instrumented case studies and large-scale physical modelling, complemented by constitutive modelling and computational analyses. The findings demonstrate that recycled rubber tire assemblies infilled with waste materials, together with rubber mats and grid systems made from recycled conveyor belts, reduce stress transmission, enhance energy absorption, and improve long-term track performance on weak soils under train passage loads.

### BIO

Buddhima Indraratna, a Member of the Order of Australia, is a Distinguished Professor of Civil Engineering, and Director of Transport Research Centre, at the University of Technology Sydney (UTS). He graduated in Civil Engineering from Imperial College, London, and obtained his PhD from the University of Alberta in 1987, after several years in industry. He was honored as the 6th International Civil Engineer in Madrid, an accolade conferred by the Jose E. Ibarra Foundation and the Technical University of Madrid. He was also awarded the Sir John Holland Civil Engineer of the Year 2024 by Engineers Australia. His distinguished career is further marked by the ISSMGE's inaugural Ralph Proctor Lecture and the 4th Louis Ménard Lecture, and the EH Davis Memorial Lecture of the Australian Geomechanics Society. He has successfully supervised over 120 research students (~90 PhDs) and over 45 Postdoctoral Fellows. He has authored more than 1,000 publications, including 14 books and over 500 Q1 journal articles, and is recognised among the world's most highly cited civil engineers (h-index=100). With extensive experience as a geotechnical consultant and former UN expert, he brings both academic authority and practical insight. He is a Fellow of the prestigious Australian Academy of Technological Sciences and Engineering and a Life Member of the Australian Geomechanics Society.

**\*This webinar series is intended to retain the legacy of Prof. Chandrakant Desai for his original and seminal contributions to Geomechanics.**



Speaker

