Eight International Conference on the

Bearing Capacity of Roads, Railways and Airfields

The University of Illinois at Urbana-Champaign
June 29-July 2, 2009, Champaign, Illinois, USA

(http://www.BCR2A.org)

Proceedings and Conference Program on Railways
CONFERENCE TECHNICAL PROGRAM

Pre-Conference Workshop, 1:00 – 5:00 PM, Monday, June 29, 2009

Railroad Track Design Including Asphalt Trackbeds

Coordinated by Jerry Rose, University of Kentucky (for info, please contact jrose@engr.uky.edu; to register, please go to www.BCR2A.org)

The workshop will provide an overview of the procedures currently utilized for the structural design of railway tracks, initially concentrating on the more traditional or empirical methods. In addition a tutorial will be provided covering the more recent mechanistic, such as finite element, methods. Emphasis will be placed on analyzing the track structure as a series of interactive layers, the performance of each being somewhat dependent on the properties of the others. Attention will be given to mechanistic analysis and design procedures that have as outputs - an analysis of the stresses and strains at the various layer interfaces and the methodology for predicting the performance and estimating the life of tracks for various designs and loading conditions.

A methodology to determine the required granular layer thickness (ballast + subballast) to prevent railway subgrade failure under repeated traffic load will be presented. This design approach accounts for the two most common subgrade problems in the railroad industry: progressive shear failure and excessive plastic deformation (ballast pockets). This design methodology considers the dynamic wheel load and cumulative traffic tonnage, as well as the strength and stiffness properties of the granular materials and the subgrade. The presentation will discuss GEOTRACK and its role in the design process, and will also present enhancements to conventional ballast trackbed, specifically HMA and tensile reinforcement.

Various innovative designs and configurations will be featured for both ballasted and ballastless trackbeds that are specifically structurally configured to provide extended life and superior performance for modern high-speed and heavy tonnage rail lines. Practices utilized by United States railway entities and various International railway authorities will be included. The procedures of using a layer of asphalt within the trackbed to induce specific properties to the track structure will be highlighted. The design practices and installation practicalities unique to this system will be described and compared to conventional ballasted trackbed design and construction. Performance measures for evaluating the relative values and economics of innovative trackbed designs will be described.

Introduction to Railroad Track Structural Design -- Don Uzarski, University of Illinois

Trackbed Structural Design including GeoTrack Analyses and Other Design Related Items -- James P. Hyslip, HyGround Engineering

State-of-the-Art on the Use of Bituminous Subballast on European High-Speed Rail Lines -- Paulo F. Teixeira, Technical University of Lisbon

Challenges Presented to Track Substructure Design Engineers in Today’s Railroad Environment -- Thomas B. Schmidt, BNSF Railway Co.

Design, Evaluation and Utilization of Asphalt Trackbeds – Jerry G. Rose, University of Kentucky

Kentrack – A Structural Design Program for Railway Trackbeds – Jerry G. Rose, University of Kentucky
Day 1 - Tuesday, June 30, 2009

8:00 AM Registration and Exhibits Open

9:00 AM - 12:00 PM Opening Plenary Session

Opening Remarks by Erol Tutumluer and Imad Al-Qadi

Keynote Presentation on Railways: “The performance of rail track incorporating the effects of ballast breakage, confining pressure and geosynthetic reinforcement” by Professor Buddhima Indraratna
University of Wollongong, Australia

12:00 PM-1:30 PM Lunch and Exhibits

1:30 PM - 3:15 PM Technical Track 1

Concurrent Session 1D: Railroad Track Structures I

23. Pressure measurements and structural performance of hot mixed asphalt railway trackbeds
   L.S. Bryson & J.G. Rose

192. Effects of incorporating a bituminous subballast layer on the deformation of railway trackbeds
    T. Ferreira, P.F. Teixeira & R. Cardoso

48. An innovative slab track test-line in China
    J. Ren, R. Xiang & B. Lechner

248. Comparison of in situ performance-based tests methods to evaluate moduli of railway embankments
    A. Gomes Correia, J. Martins, L. Caldeira, E. Maranha das Neves & J. Delgado

3:15 PM-3:45 PM Break and Exhibits
3:45 PM-5:30 PM Technical Track 2

Concurrent Session 2D: Railroad Track Structures II

22. Evaluation of roadbed stiffness on bearing capacity of railroad ballast with discontinuous analysis
   T. Ishikawa, T. Kamei, E. Sekine & Y. Ohnishi

124. Actions on railway track panel and ballast - behavior of the Hellenic limestone ballast
     K. Giannakos & A. Loizos

162. Ballast evaluation and hot mix asphalt performance
     H.M. Lees

264. Comparison of coal dust fouled railroad ballast behavior – granite vs. limestone
     W. Dombrow, H. Huang & E. Tutumluer

6:30 PM-8:30 PM Technical Visit - Advanced Transportation Research and Engineering Laboratory (ATREL) - Barbeque Reception
Day 2 - Wednesday, July 1, 2009

7:30 AM Registration

8:00 AM-9:45 AM Technical Track 3

Concurrent Session 3D: Railroad Track Structures III

212_ Measurement of vibrations induced by high-speed trains

211_ Influence of the stiffness-damping coupling of the foundation in the performance of a high-speed train track
J. Cunha & A. Gomes Correia

44_ Emerging trends for high-speed rail track superstructures – ballastless track as an alternative to the ballasted track
A.M. Paixão, E.C. Fortunato & M.L. Antunes

Dynamic responses and cyclic settlement of railway substructure
X. Bian

9:45 AM - 10:15 AM Break and Exhibits

10:15 AM-12:00 PM Technical Track 4

Concurrent Session 4D: Railroad Track Structures IV

249_ Railway bridge transition case study
J.P. Hyslip, D. Li & C.R. McDaniel

161_ Reducing track faults using polymer geocomposite technology
P.K. Woodward, G. Medero & D.V. Griffiths

Discrete Element Model of Ballast Aggregates Based on Imaging
H. Huang, E. Tutumluer, Y.M.A. Hashash, J. Ghaboussi

12:00 PM - 1:30 PM Lunch and Exhibits