



[Journal information](#)

[Editorial board](#)

[Back issues](#)

[Instructions to authors](#)

[Search EJTIR](#)

[print deze pagina](#)

## System analysis of train operations and track occupancy at railway stations

Lei Nie\*, \*\* and Ingo A. Hansen\*\*

\* Beijing Jiaotong University  
China

e-mail: [leinie@263.net.cn](mailto:leinie@263.net.cn)

\*\* Delft University of Technology  
Delft

The Netherlands

e-mail: [i.a.hansen@citg.tudelft.nl](mailto:i.a.hansen@citg.tudelft.nl)



[Full text pdf](#)

### EJTIR Alert service

Subscribe to the  
EJTIR Alert service

### Abstract

A system analysis approach is presented for investigation of train operations in railway stations based on network, timetable and train detection data. The estimated blocking times, buffer times and track occupancies are compared with real operations data recorded automatically by track circuits. Statistical analysis of train operations between two Dutch major railway stations in The Hague clearly reveals that the trains operate at lower than design speed and the capacity of the critical routes to/from the platform tracks via level crossings is occupied up to 80 %. Furthermore, the dwell times at platform tracks are systematically extended due to hinder by other trains and behaviour of railway personnel. The scheduled headway between arrival and departure of some pairs of trains at critical route nodes proves to be insufficient, because the scheduled dwell times at stations and running times at junctions are generally exceeded and often leads to route conflicts if the headway times are short. The quality of timetable design and train operations in stations would be improved significantly if the feasibility of the scheduled arrival and departure times at major transfer stations was proven by a detailed estimation of the blocking and buffer times based on observed running times and delays during operations. The buffer time at junctions and level crossings should reflect the distribution of real train speeds and blocking times.

Received: November 2003

Accepted: April 2005

Keywords: Timetable, operations, station, track occupancy, blocking time, buffer time