

A Model for Simulating and Analysing Workspace Congestion in Civil Engineering Job-sites

Swee Yang Low

National University of Singapore
phone: 65-6516-4072
fax: 65-6773-1012
e-mail: edmundlow@nus.edu.sg

DKH Chua

National University of Singapore
e-mail: ceedavid@nus.edu.sg

Abstract— Key activities such as transporting and installing components e.g. pre-cast beams and boilers on civil engineering job-sites are often hindered by workspace congestion. Such spatial congestion may arise due to restrictive site spaces or concurrent activities. Macro-planning tools that optimise sequencing of activities or site configuration have limited effectiveness in eliminating such workspace congestion, as they cannot fully account for unexpected delays, or adequately plan for day-to-day operations. Left unresolved, workspace congestion issues could threaten the timely completion of the project. To address this problem, a model was developed for simulating and analysing workspace congestion during transport and installation activities on civil engineering job-sites. The model creates a virtual environment of the job-site, allowing the user to simulate the transport or installation operation prior to actual implementation, thereby predicting any spatial congestion that may arise. It also includes three features to facilitate the resolution of any congestion issues discovered during this virtual walk-through: object layers, automatic path-correcting and finite workspace elements. The model was tested on a real-life case study, demonstrating its potential as a platform for further development into an inexpensive, readily usable tool for addressing workspace congestion issues in civil engineering job-sites.

Index Terms—Path-finding; Simulation; Site Accessibility; Workspace Congestion