A Web-Based Tool for Cross Dock Trailer Scheduling

Technology Transfer Activities

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Table of Contents

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1 Outputs

This project was solely focused on technology transfer. A web-based animation was developed to display the results of previous research that addressed scheduling inbound and outbound trucks to and from a cross dock. The motivation is that cross docking is a rather commonly used approach to load consolidation in today's logistics networks and will surely be more prominently features in future networks based on horizontal collaboration.

Users specify inputs that define a scenario which is animated. Times were scaled so that the animation runs in a few minutes rather than the multiple hours that would occur at a real cross dock; however, since parameters of the model and animation are consistent with practice, the sequence reflects the solution determined by the near-optimal solution of the mixed integer programming model and all timing of trucks (arrival and departures) are also the same as the near-optimal solution in a relative sense (i.e., they are just scaled to be shorter).

2 Outcomes

This animation provides a mechanism for anyone to view and understand the practical implications of the previous theoretical research. Users do not need to have any technical background.

The web-based animation provides users with a simple dashboard from which they can adjust key parameters and then watch an animation of the near-optimal solution. That is, the animation shows inbound and outbound trucks arriving, being docked, and departing in the sequence and at the times provided by the near-optimal solution that minimizes outbound delays while ensuring dock doors are available and storage is kept as small as practical.

Users can, for example, watch the impact of doubling the number of dock doors in a cross dock. The will see trucks arriving, being docked, and departing so intuition is built on congestion and door utilization. The total makespan (i.e., the time between first inbound truck arrival and last outbound truck departure) is also reported after the animation is completed so in addition to intuition, there is an important quantitative measure provided as well.

3 Impacts

The hope is that this animation brings the theoretical research in scheduling inbound and outbound trucks to a cross dock to a much wider audience. Cross dock operators with no technical background can use the animation to gain a better sense of the tradeoffs between some of the key controls associated with cross docking. By making these research results accessible to actual users who might have a wide variety of technical backgrounds, the hope is that cross dock operations will be improved in practice because the current operators will have a better understanding of how decisions impact the effectiveness and efficiency of operations.