
Time-dependent scheduling with replenishable resources

Steffen Pottel*¹ and Asvin Goel*¹

¹Kühne Logistics University (KLU) – Germany

Abstract

In many real-life vehicle routing problems, the time required to travel between locations varies depending on traffic levels. If electric vehicles are used, these variations in travel time can lead to higher or lower overall energy consumption, and, thus, the time when batteries must be recharged may vary as well. Similarly, if hours of service regulations must be complied with, variations in travel time can lead to variations in the timing of compulsory break or rest periods. In this contribution we study the problem of determining feasible schedules for routes in which travel times are time-dependent and resources required for driving, e.g. energy levels of batteries or alertness levels of drivers, must be replenished during the route. Because of the interaction of resource replenishments and time-dependent travel times, the first-in first-out property typically exploited in time-dependent routing and scheduling does no longer hold. In this contribution we propose an efficient methodology to solve time-dependent scheduling problems with resources that must be replenished while en-route.

Keywords: Time-dependent scheduling, Electric vehicles, Hours of service regulations

*Speaker