

## **Review of Dissertation Thesis**

Title: Train Platforming Problem Solving

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### **a) Topicality of a theme**

Dissertation thesis deals with current problem of algorithmic support for tactical timetable planning and operational decision-making process of train dispatchers in busy and complex railway stations. Decision-making process supported by results of this thesis will contribute to higher stability of railway service as a system. Service fluency and accuracy (delay of approaching and departing trains) is one of very strongly monitored criterion from viewpoint of passengers.

### **b) Methods**

Decomposition of technological process is suitably used for identification of conflicts between arrival and / or departure trains (or their sojourn times) in railway station. The technological point of view is also applied in other part of problem solving – e.g. by determining the reasons of waiting at home signals. Mixed integer mathematical programming model is used for assignment of trains to platforms. Matheuristic algorithm is applied for problem solving in more busy (more complex) stations.

### **c) Objectives**

Objective of dissertation is to propose a process of train assignment to platform tracks in large and busy railway stations. Optimality criterion is (minimal) total weighted delay of trains resulting from conflicts on the junctions (switches) and / or platform tracks. Ph.D. student is using sequential steps for reaching the objective of dissertation. I evaluate developed program for assignment of trains to platforms very positively as well.

### **d) Results and benefits**

Inter alia I consider the decomposition and applied approach to solution of problem of divided platform tracks (tracks for 2 trains) as a benefit of dissertation. This problem is not reflected in current methodology SŽDC D24 (Regulation for capacity estimation) in a precise way.

In my opinion, technological part of dissertation can be evaluated as average, mathematical and programming part as above average. Dissertation shows one of possible ways for modelling of operation technology in conditions of divided station tracks. In general point of view, dissertation outputs present one another methodology for solution of train platforming problem.

### **e) Contribution for praxis and science**

Testing of a new matheuristic algorithm in conditions of busy railway stations (for tactical and operative train platforming planning) can be considered as a specific contribution for praxis and science. Student has verified her methodology and its functionality in real conditions for one-day platforming plan in the railway station Prague Main Station.

#### **f) Formal arrangement of Dissertation**

Dissertation Thesis contains 88 numbered pages of the text, 7 chapters, Introduction and Conclusion, Bibliography and list of Ph.D. student's publications. Its content is logical, each chapter presents partial steps of problem solution. Some formal mistakes don't affect the resulting level of dissertation.

#### **Conclusion**

**In my opinion Dissertation Thesis meets conditions stated by Law No. 111/1994 Sb., § 47, sect. 4. I recommend Dissertation Thesis to defence.**

I have these questions for the student:

1. How could be changed the calculation (solution) of train platforming problem for smaller or bigger railway stations than the Prague Main Station? Are there some busier (more complex) stations than Prague Main Station in your country?
2. What do you consider as the most stressful factor in work of train dispatchers?
3. Sometimes it is necessary to assign two given trains to one platform due to simplification of an interchange of a wheelchair user. It is possible to implement such constraint into yours model?

In Pardubice, 6. 11. 2017

Reviewer: 

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