



LUND UNIVERSITY

Automatic Control LTH

1(2)

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Review of the Dissertation by Jan Kelbel

Dear Evaluation Committee,

although my areas of expertise covers only partially the topic discussed in this dissertation, I found very interesting to read this PhD thesis.

The thesis considers three combinatorial optimization problems that arise in manufacturing:

1. a process that includes multiple production stages with earliness/tardiness penalties (as they appear in Just-in-Time inventory strategies);
2. the re-optimization of the placement of machines along a production line;
3. the determination of the optimal order to execute jobs that need to be processed by m resources.

Apart from some some different usage of terminology (for example, in real-time scheduling a task is composed by a set of jobs, while in this thesis a job consists in a set of tasks) I did understand the presented ideas.

In Chapter 2, I find some points of contact between the ETJSSP and the problem of scheduling real-time pipelines over a distributed or parallel execution platform. Maybe you could compare with some of the work by Jayachandran and Abdelzaher, "Delay Composition Algebra: A Reduction-Based Scheduling Algebra for Distributed Real-Time Systems" appeared at the 29th IEEE Real-Time Systems Symposium, 2008. Below, some details about this chapter:

- page 8, row -2 (2nd from bottom): what do you mean by "about the same cardinality"? Please be more precise;
- page 9, Section 2.2.2: to illustrate the Lacquer production problem a figure would certainly help those who are not familiar with the problem (similarly to what you actually included at page 30 to describe the SMT assembly line).

In Chapter 3, the problem specification (Section 3.3.2) comes after the description of the assembly line (Section 3.2). I think it would be beneficial merge the two sections in a way that as the problem is described the opportune needed modeling variables/constraints are introducing without one has to wait Section 3.3.2 to see how the problem is translated.

The problem described in Chapter 4 is the one I found most interesting. Below I report some details

- page 51, row -3: I think that " T_j " should be " J_j ";
- page 52, row 2: "each job j " should be "each job J_j " or "the j -th job";
- page 57, Section 4.3.3: I suggest to recall what is the grid graph, possibly with a figure;
- page 71: please mention the journal to which you submitted the last paper in the list.

I believe that all these issues can be addressed by the student. Hence I recommend a positive outcome of the doctoral thesis defense.

Enrico Bini

