



DFG Research Center
MATHEON
mathematics for
key technologies
www.matheon.de

Project B24

Scheduling Material Flows in Logistics Networks



Technische Universität Berlin

Marco Lübbecke Rolf H. Möhring

Domain of Expertise: Logistics

Scheduling

Allocating tasks to scarce resources over time.
(B13)

Routing

Decisions concerning space in a network.
(B8)

Interdependency of both in several optimization problems:

Capacity or availability of resources changes over time depending on the routing of the tasks. This has influence on the schedule which again affects the routing.

Scheduling Material Flows in Logistics Networks

Integrated Approach!

Interesting issues

- degree of interdependency between routing and scheduling
- optimization potential of integrated treatments
- complexity
- influence of structures in practical instances
- approximation algorithms (maybe by modest separation)
- game theoretic approaches
- from static to dynamic conflict graphs
- suitable relaxations or decomposition approaches for integer programming models

MIDAS / 5,60
R / 6,70
1 / 3,70
S / 3,80
L / 3,10

App: Steel Logistics

Scheduling of several cranes in a steel yard in order to transport steel slabs between various locations.



App: Kiel Canal

Control of bi-directional ship traffic through the Kiel canal where regulations concerning entering, safety distances, passing, overtaking, and waiting at sidings induce capacities for the canal segments.



WATER / 3,70
12:00

2. JEANNY / 1,50

3. HOLTEI

12:00

Industrial Cooperation

- PSI Business Technologies
- Salzgitter Fachstahl GmbH
- WSA Kiel-Holtenau

MATHEON Cooperation

- B13 (preparation of the Kiel canal cooperation)
- B18 (flows over time)
- B23 (robustness issues)
- C30 (scheduling laser welding robots)

External Cooperation

- MPI Saarbrücken (scheduling aspects)
- U Milan (split-delivery routing)
- NTNU Trondheim (split-delivery routing)
- TU Darmstadt (integer programming aspects)
- CWI Amsterdam (game theoretical aspects)

Outreach

- www.dfg-science.tv