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FAKULTÄT FÜR
WIRTSCHAFTSWISSENSCHAFT

Forschungsbericht 2024

Lehrstuhl BWL, insb. Operations Management

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1. LEITUNG

Prof. Dr. Janis Sebastian Neufeld

2. HOCHSCHULLEHRER/INNEN

Prof. Dr. Janis Sebastian Neufeld

3. FORSCHUNGSPROFIL

Forschungsschwerpunkte:

- Maschinenbelegungsplanung / Scheduling
- Produktionsplanung und –steuerung
- Betrieb und Planung von Eisenbahnverkehrsnetzen
- Schichtplanung
- Mathematische Programmierung und Metaheuristiken

4. KOOPERATIONEN

- dwh GmbH (Drahtwarenhandlung)
- Loyola University Chicago
- Shanghai Maritime University
- Technische Universität Dresden
- University College Cork
- University of Alabama
- Universität Wien
- WHU Vallendar
- ÖBB-Produktion Gesellschaft mbH

5. FORSCHUNGSPROJEKTE

Projektleitung: Prof. Dr. Janis Sebastian Neufeld
Kooperationen: Technische Universität Dresden
Förderer: Haushalt - 01.01.2024 - 31.12.2026

Transportation efforts in distributed manufacturing environments

Large manufacturing companies often manage a network of multiple factories, creating distributed scheduling problems. These problems involve assigning jobs to one of several distributed factories and sequencing the jobs within their designated factories. However, planning in distributed environments also requires the transport of jobs to factories. These transports are usually neglected in the existing planning approaches but can significantly impact the generated plans. We analyze the impact of transportation concerning classical scheduling objectives and environmental objectives such as emissions and energy consumption. Furthermore, inter-factory transports of intermediate goods are analyzed.

Projektleitung: Prof. Dr. Janis Sebastian Neufeld
Kooperationen: University College Cork; Loyola University Chicago; Technische Universität Dresden
Förderer: Sonstige - 01.01.2024 - 31.12.2026

Scheduling in capacitated production environments

In traditional scheduling research, machines are supposed to be only able to process one job at a time. However, in several real-world situations, machines can process several jobs in parallel up to a given capacity. One example is the growing of crops in greenhouses. The arising capacitated scheduling problems form a generalization of well-studied scheduling problems and have rarely been studied in the literature. We analyze the characteristics of these problems in various settings, such as flow shop or job shop. Tailored algorithms are developed to solve realistic problem instances considering multiple objectives.

Projektleitung: Prof. Dr. Janis Sebastian Neufeld
Kooperationen: Technische Universität Dresden
Förderer: Sonstige - 01.01.2023 - 31.12.2025

Scheduling in hybrid flow shops with lot streaming

Scheduling is one of the most relevant planning tasks in operations management and describes the sequencing of jobs on machines. In practice, so-called hybrid flow shops (HFS) are often found, i.e., production lines in which several machines are available in the individual production stages. This means that, in addition to the sequence of the jobs, the jobs must also be assigned to the individual machines. Using lot streaming, i.e., the early transfer of sublots to subsequent production stages, can increase efficiency. However, quantifying the benefits of lot streaming is still necessary and tackled in this project. Because traditional planning approaches are usually unable to solve the complexity of this planning task, solution algorithms for this problem will be developed and evaluated. Problem properties are exploited to improve the approaches further. The developed algorithms can enable higher productivity and efficiency in industrial production in the future.

Projektleitung:	Prof. Dr. Janis Sebastian Neufeld
Kooperationen:	dwh GmbH (Drahtwarenhandlung); ÖBB-Produktion Gesellschaft mbH; Universität Wien; Technische Universität Dresden
Förderer:	Sonstige - 01.01.2024 - 31.03.2025

VIPES - Reliable and Integrated Planning of Circulations and Shifts in Railway Systems

Existing powerful operations research methods enable the creation of highly efficient plans for deploying personnel and vehicles in rail transport. In the implementation, however, delays and breakdowns mean that the plans can often not be executed as intended. To meet this challenge, in the project VIPES, methods are developed to design schedules for traction units and shift schedules for train crews in such a way that they are efficient and reliable at the same time. This is to be made possible by intelligent interaction between optimization and simulation. Machine learning techniques are used to identify efficient and reliable solution structures, which will be used in the solution procedures.

6. VERÖFFENTLICHUNGEN

BEGUTACHTETE ZEITSCHRIFTENAUFSÄTZE

Becker, Tristan; Neufeld, Janis S.; Buscher, Udo
The distributed flow shop scheduling problem with inter-factory transportation
European journal of operational research - Amsterdam [u.a.]: Elsevier . - 2024 ;
[Online first]

Hoffmann, Julius; Neufeld, Janis; Buscher, Udo
Minimizing the earliness-tardiness for the customer order scheduling problem in a dedicated machine environment
Journal of scheduling - Dordrecht [u.a.]: Springer Science + Business Media . - 2024, insges. 19 S.
[Imp.fact.: 1.4]

NICHT BEGUTACHTETE ZEITSCHRIFTENAUFSÄTZE

Päprer, Paul; Neufeld, Janis Sebastian; Buscher, Udo; Kunovjanek, Maximilian; Wastian, Matthias; Rosenberger, Jakob; Joshi, Kanchan; Scherr, Ninja; Ehmke, Jan; Schwab, Nadine; Popper, Nikolaus
Zielkonflikte in der Umlaufplanung für Triebfahrzeuge
Eisenbahntechnische Rundschau - Hamburg : DVV Media Group, Eurailpress, Bd. 73 (2024), Heft 10, S. 24-28