**Condition-aware operation and scheduling**

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**Condition-aware operation and scheduling**

Motivation and Objective: Taking equipment condition and performance into account in scheduling and operations allows for more accurate optimization affecting safety, reliability, and profit.

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**Integrated Prognosis and Operation**

- Novel Condition-based maintenance formulation accounting for degradation uncertainty
- Integration prognosis and operation optimization
- Stochastic programming and endogenous uncertainty
- Dynamic interaction between the scenario tree and the health of the equipment via prognostic models

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**Optimization of energy consumption in the EAF process**

The first step in the stainless-steel production process from recycled material, the melting process, is the most energy intensive. Its efficiency changes according to the properties of the raw materials.

- A novel optimal control problem that calculates the setpoint of the melting furnace was explored in this work.
- Novel models of the process were developed and validated

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**Combined Maintenance Scheduling and Planning**

- Perform maintenance because of degradation, not just because of approaching asset failure
- Discrete-time model based on Resource-Task Network approach (MILP)
- Consider various types of maintenance
- Novel enumerator formulation
- Applicable to large asset fleets (e.g., compressors)
- Improvement of operational profit

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**Demand-Side Management and Equipment Condition**

- The goal of steel plant scheduling is to balance the complex trade-offs between electricity usage (and the associated time-based price), electrode degradation, and task timings
- Discrete-time approach based on the Resource-Task Network (MILP) with the goal of minimizing total production cost

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**Short-term scheduling of multi-product batch plant**

The aim is to improve batch scheduling in a multi-product batch plant by explicit consideration of batch-to-batch evolution of fouling

- Novel formulation for condition-aware batch scheduling
- Continuous-time precedence based approach (MILP)
- Integrate with prognosis model for sequence-dependent fouling evolution

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