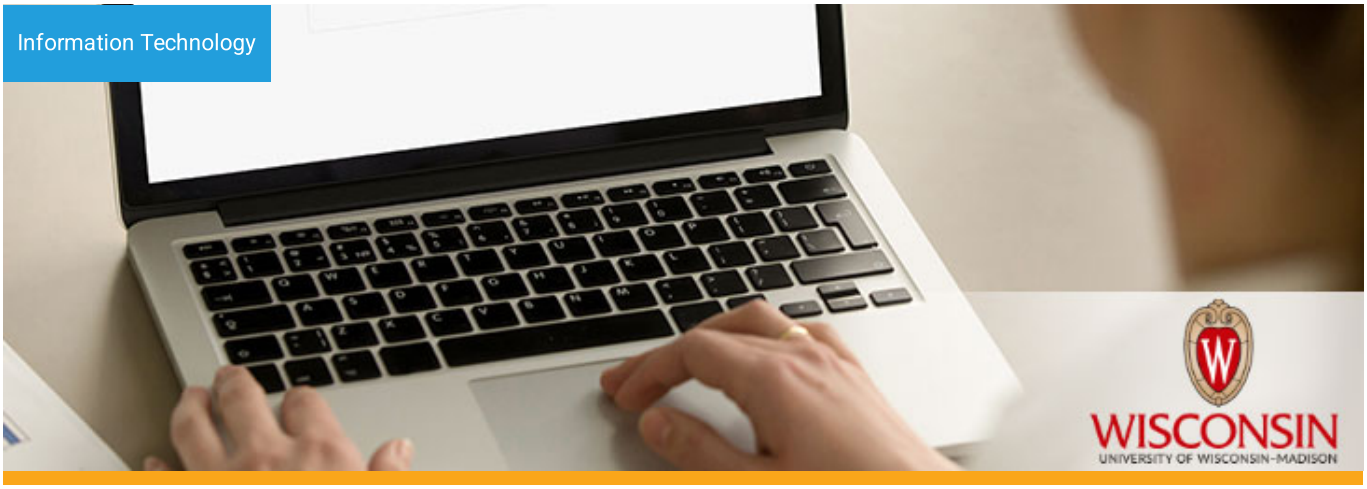
Information Technology



Streamlined Scheduling for Large-Scale Chemical Production

View U.S. Patent No. 9,146,550 in PDF format.

WARF: P120218US01

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a chemical production scheduling software system that employs propagation algorithms to estimate the type and number of batches needed to meet customer demand.

Overview

In chemical manufacturing, a production system may receive and process raw materials in multiple steps, with each step or task associated with a certain procedure or tool. Ideally, each step is scheduled to maximize efficiency and minimize total processing time. This can lead to complex scheduling that requires computer modeling.

Mixed integer programming (MIP) is used widely in industry to solve optimization problems. However, despite hardware and software advances, MIP models for chemical production scheduling remain computationally very expensive.

The Invention

UW–Madison researchers have developed a new propagation algorithm to accelerate the solution of MIP models for chemical production scheduling. Based on equipment and material limitations, the algorithm estimates the number of batches and the amount of materials that should be processed in order to meet customer demand. These estimates are used to constrain the search space of the MIP model, leading to dramatic computational improvements.

Applications

- Making scheduling tools and services faster

Key Benefits

- Simple method - can be integrated in existing tools
- Faster solution of scheduling problems
- Allows frequent reoptimization, leading to higher efficiency
- Allows generation of multiple schedules

Stage of Development

The researchers tested the algorithm on a wide range of problems, including different production environments and various processing characteristics and constraints. The new algorithm leads to an average computational enhancement of three orders of magnitude.

Publications

- Velez S., Sundaramoorthy A. and Maravelias, C.T. Valid Inequalities Based on Demand Propagation for Chemical Production Scheduling MIP Models. Submitted for publication, AIChE J.

Tech Fields

- Information Technology : Computing methods, software & machine learning
- Materials & Chemicals : Synthesis

For current licensing status, please contact Emily Bauer at emily@warf.org or 608-960-9842