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PII: S0098-1354(17)30233-8
DOI: http://dx.doi.org/doi:10.1016/j.compchemeng.2017.05.024
Reference: CACE 5826

To appear in: *Computers and Chemical Engineering*

Received date: 20-10-2016
Revised date: 18-5-2017
Accepted date: 22-5-2017

Please cite this article as: Rossi, Francesco., Casas-Orozco, Daniel., Reklaitis, Gintaras., Manenti, Flavio., & Buzzi-Ferraris, Guido., A Computational Framework for Integrating Campaign Scheduling, Dynamic Optimization and Optimal Control in Multi-Unit Batch Processes.*Computers and Chemical Engineering* http://dx.doi.org/10.1016/j.compchemeng.2017.05.024

A Computational Framework for Integrating Campaign Scheduling, Dynamic Optimization and Optimal Control in Multi-Unit Batch Processes

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Highlights

- Method for the integrated scheduling & online optimization/control of batch systems
- Two-phase methodology with an offline and an online phase
- No need for the solution of a mixed-integer optimization problem online
- Any process recipe structure, including any type of recycle, is supported

Abstract

This contribution presents a framework for addressing the campaign scheduling, dynamic optimization and optimal control of batch processes in an integrated fashion. The strategy is comprised of an offline and an online phase. The first involves solving a conventional campaign scheduling problem and serves to generate key information needed in the second. The latter consists of a modified dynamic optimization/optimal control algorithm and serves to update the offline campaign schedule in real time as well as to provide the batch process with optimal control actions to achieve maximum campaign profit/performance. As a result of this two-phase architecture, the algorithm avoids the solution of a mixed-integer optimization problem online and can support virtually any process recipe structure including any type of recycle. To demonstrate its potential, we test the proposed methodology to solve the integrated campaign scheduling, dynamic optimization and optimal control of a batch plant for the production of nopol.