Industrial aspects on production scheduling models and solution methods

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Abstract

This presentation provides a brief review on existing scheduling methodologies developed for process industries, focusing on the industrial aspects of scheduling, and discusses the main characteristics of existing approaches, including their strengths and weaknesses. Even if optimization tools of today can in many cases effectively support plant level production planning, there is still clear potential for improvements, especially in transferring academic results into industry. Usability, interfacing and integration are some central aspects that will be discussed in the presentation. After the introduction and problem classification, emphasis is given to lessons learned from industry including some general guidelines and examples on the modeling and solution of industrial problems.

The paper presents the main findings of an extensive review paper (Harjunkoski et al., 2014) and aims at reducing the gap between theory and practice. As scheduling problems arise in almost any type of industrial production facilities (Pulp and Paper, Metals, Oil and Gas, Chemicals, Food and Beverages, Pharmaceuticals, Transportation, Service, Military, etc.), it is important to ensure that the re-usability of models can be maximized. This is a challenge since the production of various processes must be appropriately planned to ensure that the equipment, material, utilities, personnel and other resources are available at the plant when they are needed to realize the production tasks. Apart from economic benefits, good schedules can also contribute to reducing the environmental load, energy demand, violations of various regulations and help coping more efficiently with uncertainties, both in production as well as in customer order levels.

The presentation puts special focus on deployability issues – something so far neither discussed much within the scheduling literature – nor in reviews. The practical value and benefits of using optimization approaches for planning and scheduling will be presented through a number of examples and main emerging industrial challenges will be discussed.

References

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