**441a Short-Term, Medium-Term, and Reactive Scheduling of an Industrial Polymer Compounding Plant**

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In multiproduct batch plants, different products are manufactured via the same or similar sequence of operations by sharing available pieces of equipment, intermediate materials, and other production resources. They have long been accepted for the manufacture of chemicals that are produced in small quantities and for which the production process or the demand pattern is likely to change. The inherent operational flexibility of this type of plant provides the platform for great savings reflected in a good production schedule.

In this work, the medium-term production scheduling problem of a multipurpose, multiproduct industrial polymer compounding plant is modeled using a novel continuous-time mathematical formulation first developed in [1]-[5]. The methodology consists of the decomposition of the whole scheduling period to successive short horizons of a few days. A mathematical model is implemented to determine each short horizon and the corresponding products to be included. Then, a novel continuous-time formulation for short-term scheduling of batch and continuous processes with multiple intermediate due dates is applied to each short horizon selected, leading to a large-scale mixed-integer linear programming (MILP) problem. The scheduling model includes 60 pieces of equipment of varying types, both batch and continuous, and can take into account the processing recipes of hundreds of different products. Several characteristics of the industrial production plant are incorporated into the scheduling model and actual plant data are used to model all parameters. In addition, reaction scheduling is incorporated in the formulation in order to update the current production schedule to provide an immediate response to an unexpected event such as equipment breakdown or the addition of new orders. This reactive scheduling formulation utilizes the efficient MILP mathematical framework developed for short-term scheduling problems with modifications introduced to reflect the effects of the unforseen event. To avoid full rescheduling of the current production schedule, the formulation determines tasks which are not affected by the unforseen event and can be carried out as scheduled so that only a portion of the horizon need be rescheduled. Results demonstrate the effectiveness of medium-term scheduling techniques for industrial production facilities as well as the ability to perform reactive scheduling to determine an updated production schedule.

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