Optimization for mid-term scheduling of multiproduct and multistage batch plants with parallel units

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This work addresses the scheduling problem of batch plants of medium size, which produce multiple items using a dozen of units for the given time duration. The units may be separated into several subgroups, for example, reactors, separators, filters, etc. Multiple units, which can be in the same subgroups or not, can be used during the same time duration to satisfy its recipe. An item may be either a final product or an intermediate for other items.

These features make this type of batch scheduling problem a multiproduct and multistage bath scheduling problem involving parallel units. It requires massive computational efforts to solve the corresponding large−size problem. In this work, we propose a methodology to appropriately address this problem instead of solving a massive overall mixed integer linear programming problem. The methodology consists of two steps. In the first step, the original problem is transformed into a kind of campaign mode batch scheduling problem. In the second step, units are allocated into the individual campaigns. By applying this methodology, we can reduce the computational efforts, which has been demonstrated in numerical examples.