

Unified Approach for the Optimization of Energy and Water in Multipurpose Batch Plants Using a Flexible Scheduling Framework

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Abstract

A unified framework providing for the simultaneous reduction of energy and wastewater in multipurpose batch plants is presented in this paper. Unlike many current methods, the schedule is not predefined. Time is treated as a variable leading to the optimization of the schedule together with water and energy usage simultaneously. Since a flexible process schedule is employed, an improved result in the form of a better overall production schedule compared to schedules obtained from optimizing water and energy separately is achievable. The ability of the current method to handle industrial scale problems is also highlighted using a complex case study. Opportunities for direct water reuse and indirect water reuse, using wastewater storage, are explored as well as direct and indirect heat integration for reducing external utilities. The objective is to improve the profitability of the plant by minimizing wastewater generation and utility usage. The results from three examples are presented