

# **Operational Planning of a Large-Scale Industrial Batch Plant under Demand Uncertainty**

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The operational planning of a large-scale industrial batch plant typically occurs over a time horizon of several months with the goal of providing daily production targets and raw material requirements for the plant in question. Due to the length of the time horizon, multiple forms of uncertainty should be taken into account in order to ensure that the operational planning model does not provide unrealizable production targets and/or raw material requirements. One of the most influential forms of uncertainty is demand uncertainty due to the fact that customer satisfaction, profit maximization, and inventory minimization are directly affected by fluctuating demand. Robust optimization and Conditional Value-at-Risk techniques have been applied in order to take into account demand uncertainty. The aforementioned techniques have been integrated into a novel Planning with Production Disaggregation Model (PPDM) with the goal of providing a daily production profile which attempts to maximize profit and customer satisfaction while minimizing inventory under uncertain demand conditions. The ability of the proposed approach to address the aforementioned objectives of an operational planning model has been validated through an industrial case study of a large-scale, multiproduct and multipurpose batch plant having the capability of producing hundreds of different products over a time horizon of three months.