

Use of batch control technique in unseeded batch cooling crystallization

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A batch control technique called BMPC (batch model predictive control) has been used for reproducible generation of seed crystals in an unseeded batch cooling crystallization process. In unseeded crystallization, the seed generation through primary nucleation is the most critical step and it is necessary to find an optimum cooling profile that gives an appropriate number of seed crystals. In unseeded cooling batch crystallization, seed generation is the most critical step for uniform product. However, the heat evolved during the nucleation makes temperature control difficult. Without the active solution temperature control, the heat of crystallization results in different temperature profiles as the crystallizer is scaled-up due to the increasing volume to heat transfer surface area ratio. To overcome this problem, BMPC has been introduced and successfully employed. This technique is based on a time-varying linear system model (representing a nonlinear system along a fixed trajectory) and utilizes not only the incoming measurements from the ongoing batch, but also the information stored from the past batches.