

Model Predictive Control Of Lime Kiln; A Cost Effective Strategy

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ABSTRACT

The rotary lime re-burning kiln has been the primary method of lime re-burning in the pulp and paper industry for many years. Its popularity has continued unimpaired not only because of the monetary savings that it promotes, but also because of its simplicity of operation, low maintenance costs and reliability. Lime kiln is used in various process industries viz. Paper, sugar, cement, glass and ceramics, leather, etc. The limekiln process is inherently difficult to operate efficiently because of complex dynamics and multi-variable process with non-linear reaction kinetics, and long time delays. It becomes hazardous and explosive in nature if it is operated beyond the set points.

Model predictive controllers can provide more stable operations of the lime kiln, along with lower fuel costs and better capabilities for meeting residual carbonate production goals. The causticizing processe can cause significant issues when upsets occur, and is characterized by long process dead times and interaction between process variables that make control difficult.

In the present paper, a multivariable, non linear, time delayed model of an industrial lime kiln process is simulated and Interaction analysis between the two loops is examined using Relative gain array of the system and Neiderlinski index and analyzed for the input and output constraints handling using Preceding Horizon characteristics of Model Predictive Control strategy.