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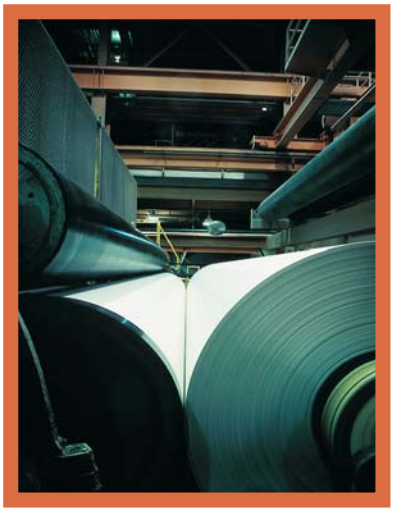
CASE STUDY: KILN CONTROL

Re-burned lime for recausticising is an important ingredient in the production of pulp for paper manufacture. Kilns that burn the lime must balance fuel consumption with good quality output and stay within environmental emissions levels. A requirement for significant manual intervention can make kiln operation difficult to control. The complications in the process make them an ideal candidate for optimisation control schemes. A scheme was imposed by Patrick Thorpe and colleagues on a kiln at a paper mill in the USA which brought significant improvements to its running cost and to the quality control of the product.

The aim of the kiln, often the most energy demanding operation at a paper mill, is to produce good quality lime. This is determined by the amount of residual carbonate in the re-burned lime product and is traditionally measured by the operator every 2 4 hours. The kiln is operated over a range of production rates and in addition the feed-rate must be stopped for approximately 5 minutes every 4 8 hours so that the lime mud feed filters can be cleaned. Each interruption causes a significant process disturbance and affects the quality of the lime produced. Moreover the high temperature excursions which may occur at these times can damage the kiln refractory and feed equipment.



A control scheme was implemented that manipulated the kiln firing rate and air flows in order to maintain an optimal kiln temperature profile, whilst staying within the prescribed excess oxygen and emissions limits. An inferential model of lime quality was developed using a neural network by relating it closely with the temperature profile of the kiln. The inferred lime quality was controlled by making adjustments to the kiln temperature profile.

The plant step tests, analysis and design of the new controller were carried out rapidly and the new scheme installed within a month, including full training of the units operators.

The benefits of the project were reaped immediately. The variability in lime quality was reduced, together with fuel consumption and emissions. The more sensitive parts of the kiln were less likely to suffer damage from high temperatures and there were improvements in its overall stability. The new controller also provides opportunities for increased production where equipment capacity is limited, and this potential is expected to be exploited in the future.

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