ABSTRACT

DESIGN OF A NEURAL NETWORK FOR
THE CONTROL OF
TRINIDAD CEMENT LIMITED'S
NO.3 ROTARY KILN

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The objective of this project is to develop an artificial neural network that is capable of simulating the operation of Trinidad Cement Limited's No.3 Kiln. Trinidad Cement Limited manufactures and markets cement, for both the local and export markets. The Rotary Kiln is used to manufacture clinker, which is the primary ingredient in cement. The optimization of the operations of the kilns is a critical factor in the effective and efficient production of cement. Hence the desire to stabilize the operations through automation. Samples of input and corresponding output data for the process were used to train four different types of networks: a backpropagation network, a backpropagation with momentum network, a momentum with adaptive learning rate network and a Levenberg-Marquardt network. The weights and biases generated by these networks were

then used to simulate the kiln process using two sets of data: one set comprising equilibrium data only; and another set comprising both equilibrium and non-equilibrium data. This process resulted in a total of thirty-four separate sets of results. The results were summarised into an average sum squared error that represents how well the various networks simulate the process. From these results it was concluded that a backpropagation network with momentum, trained with a combination of equilibrium and non-equilibrium data samples can most accurately simulate the operation of the kiln.

Keywords: Ken Anthony Wiltshire; Neural Network; Trinidad Cement Limited; Rotary Kiln.