Utilization of Genetic Algorithms for Determining Optimal Heating Industrial Furnaces

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Optimization of energy-intensive aggregates which should include the industrial heating furnace, providing not only economic savings, by reducing production costs, but also lead to the reduce the environmental impact caused by the operation of these units.

For the optimization of heating in reheating furnaces will be utilized genetic algorithms to ensure stability in the parameters of hot material while minimizing the cost of materials and energy when pulling from the furnace.

For optimal control especially through-heating furnaces, it is necessary to use the forward control of due to impossibility direct measurement of parameters of heated material. We have indirect information like temperature furnace environment, immediate fuel consumption and media temperatures of materials entering and leaving the furnace aggregate.

For a description of the model can be used two types of models. The first type of model is based on the solution of differential equations that describe the temperature field in the material and include respective type of boundary conditions and initial conditions at the beginning of the process.

Due to the large number of mathematical operations, this model is not suitable for use as a reference model for feed forward control heating. For the online control simple and fast but sufficiently accurate models of the course of heating are needed. These models go from the data that precise mathematical and physical models mentioned in the previous paragraph produce.

To achieve savings in heating, it is necessary to solve the integral optimality criteria. To provide a reliable optimum finding it is suitable to use just genetic algorithms that are proper for finding optimal crossways the range of acceptable values and that can escape the local extremes.

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