Minimization Entropic Applied to Rotary Dryers to Reduce the Energy Consumption

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Abstract : The drying process is an important operation in the chemical industry and it is widely used in the food, grain industry and fertilizer industry. However, for demanding a considerable consumption of energy, such a process requires a deep energetic analysis in order to reduce operating costs. This paper deals with thermodynamic optimization applied to rotary dryers based on the entropy production minimization, aiming at to reduce the energy consumption. To do this, the mass, energy and entropy balance was used for developing a relationship that represents the rate of entropy production. The use of the Second Law of Thermodynamics is essential because it takes into account constraints of nature. Since the entropy production rate is minimized, optimals conditions of operations can be established and the process can obtain a substantial gain in energy saving. The minimization strategy had been led using classical methods such as Lagrange multipliers and implemented in the MATLAB platform. As expected, the preliminary results reveal a significant energy saving by the application of the optimal parameters found by the procedure of the entropy minimization It is important to say that this method has shown easy implementation and low cost.