

Non-Centrifugal Cane Sugar Production: Heat Transfer Study to Optimize the Use of Energy

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Abstract : Non-centrifuged cane sugar (NCS) is a concentrated product obtained through the evaporation of water contained from sugarcane juice in open heat exchangers (OE). The heat supplied to the evaporation stages is obtained from the cane bagasse through the thermochemical process of combustion, where the thermal energy released is transferred to OE by the flue gas. Therefore, the optimization of energy usage becomes essential for the proper design of the production process. For optimize the energy use, it is necessary modeling and simulation of heat transfer between the combustion gases and the juice and to understand the major mechanisms involved in the heat transfer. The main objective of this work was simulated heat transfer phenomena between the flue gas and open heat exchangers using Computational Fluid Dynamics model (CFD). The simulation results were compared to field measured data. Numerical results about temperature profile along the flue gas pipeline at the measurement points are in good accordance with field measurements. Thus, this study could be of special interest in design NCS production process and the optimization of the use of energy.

Keywords : mathematical modeling, design variables, computational fluid dynamics, overall thermal efficiency

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