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Chapter 5
RESEARCH TRENDS IN MODELING, OPTIMIZATION AND CONTROL OF THE DRYING
OPERATION

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Abstract

Drying food is an extremely sensitive operation that requires the proper monitoring and control of the heating medium temperature as well as the length of time that the product is exposed to this temperature. Since the different food products have different heat sensitivity the heat load tolerance during drying cannot be generalized if loss of quality is to be avoided. On the other hand the drying process is a very high energy consuming operation and energy usage must be minimized without necessarily compromising on product quality. Optimization of a drying process requires that we consider the heat and mass transfer dynamics, product quality indices and production costs. Different control strategies and objective functions must be tried because it would not make business sense to produce a very high valued product at astronomical costs to the producer and nor would a low quality product sell simply because it is produced at minimum cost or energy consumption. This Chapter reviews first the research trends on modeling of the drying process based a heat and mass transfer, cost of dying and product quality. The strategic logistics that have been used over the years in attempts to optimize the drying operation have also been reviewed. Last but not least, the performance of these dryer control strategies in the practical optimization of the drying process have been discussed since it is how well a control strategies works that can make the entire optimization process either a success or a failure.