

Abstract

Particleboard manufacturing plants exist in most provinces of Iran and the issue of controlling the production process is significant. These factories attempt to generate products with identical features and reduce the time and costs caused by testing the physical properties of the board. Therefore, identifying effective variables in production line and predicted value of these properties are essential in production and can lead to Optimization process and consistent production quality. In this research, variables such as moisture content of particles before to be put in the dryer, the moisture of wood particles in the Forming machine, the amount of adhesive that is being used per every particleboard, pressing time, pressure pressing, temprature pressing, and physical properties such as: the percent of moisture(modification), the percent of water absorbtion as well as the percent of swelling of board in conditioning room and swelling properties of particleboard were gathered from "Debal khazae" Mill. The normalized data was investigated step by step multiple linear regression, artificial neural network and fuzzy systems. These procedures were carried out so as to be predicted as the most optimized models. the criteria for measurement of prediction accuracy in the physical properties is equal with the MAPE. The results showed that the best numbers for first node and second node in the prediction model in the artificial neural network BFGS for this density, the percent of water absorbtion during 2 and 24, the percent of moisture (modification) during 2 and 24 and the percent of swelling during 2 and 24 It should be mentioned as follows: 5-5, 5-5, 5-5, 5-5, 5-4, 5-5 and 5-4 based on artificial neural networks, respectively., and absolute percentage errors are 30.54, 22.13, 1.41, 2.47, 14.40, 1.28 and 1.62 percent. And the best prediction model in fuzzy systems is the Z-shaped curve with the absolute prediction errors of 22 percent. ANN method has better performance compared with the fuzzy systems.

Keywords: artificial neural networks, production process of particleboard, percentage of thickness swelling, fuzzy systems.



University of Zabol
Graduate School
Faculty of Natural Resources
Wood and paper science and technology

**The Thesis Submitted for the Degree of Master of science
(In composite and products)**

**Artificial neural network to optimiz
particleboard manufacturing process
(cuse study: physical properties).**

Supervisors:

Dr. Ali Bayat Kashkoli

Advisors:

Dr. Mohammad Shamsian

Dr. Alireza Moghadamnya

By:

Foad Neysi

October 2014